IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication NOVEMBER 23, 1961

Where Does Industry FIT Into PENTAGON'S NEW BUYING POLICIES?

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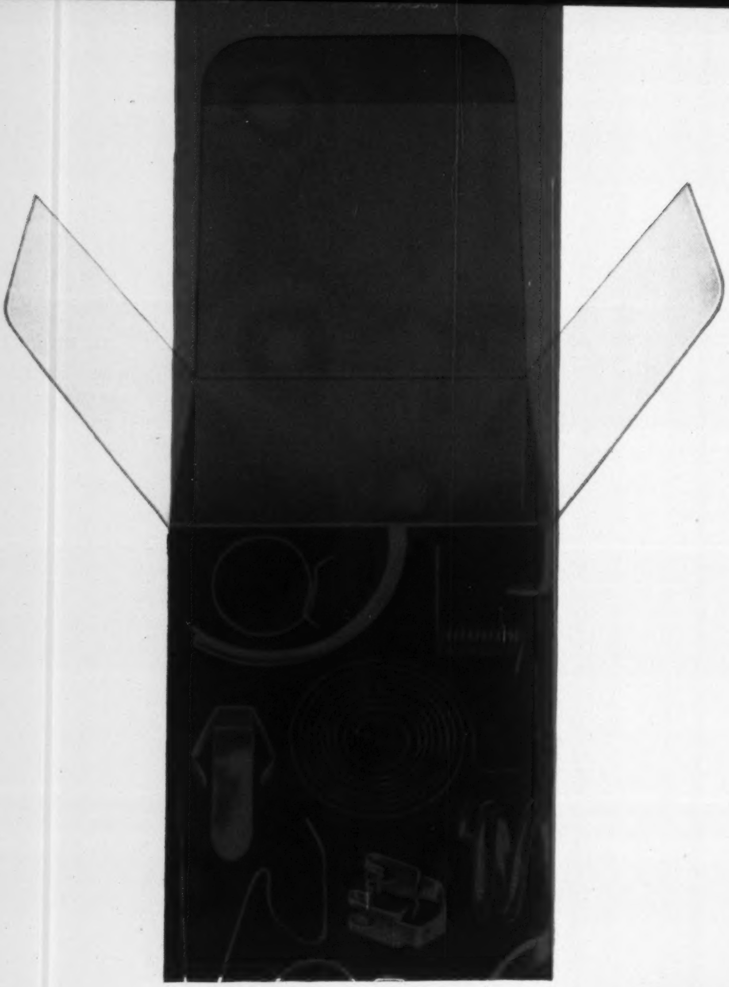

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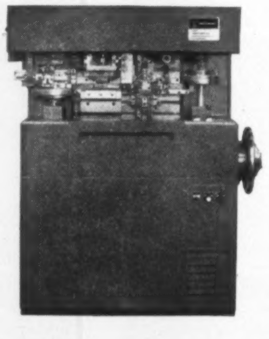

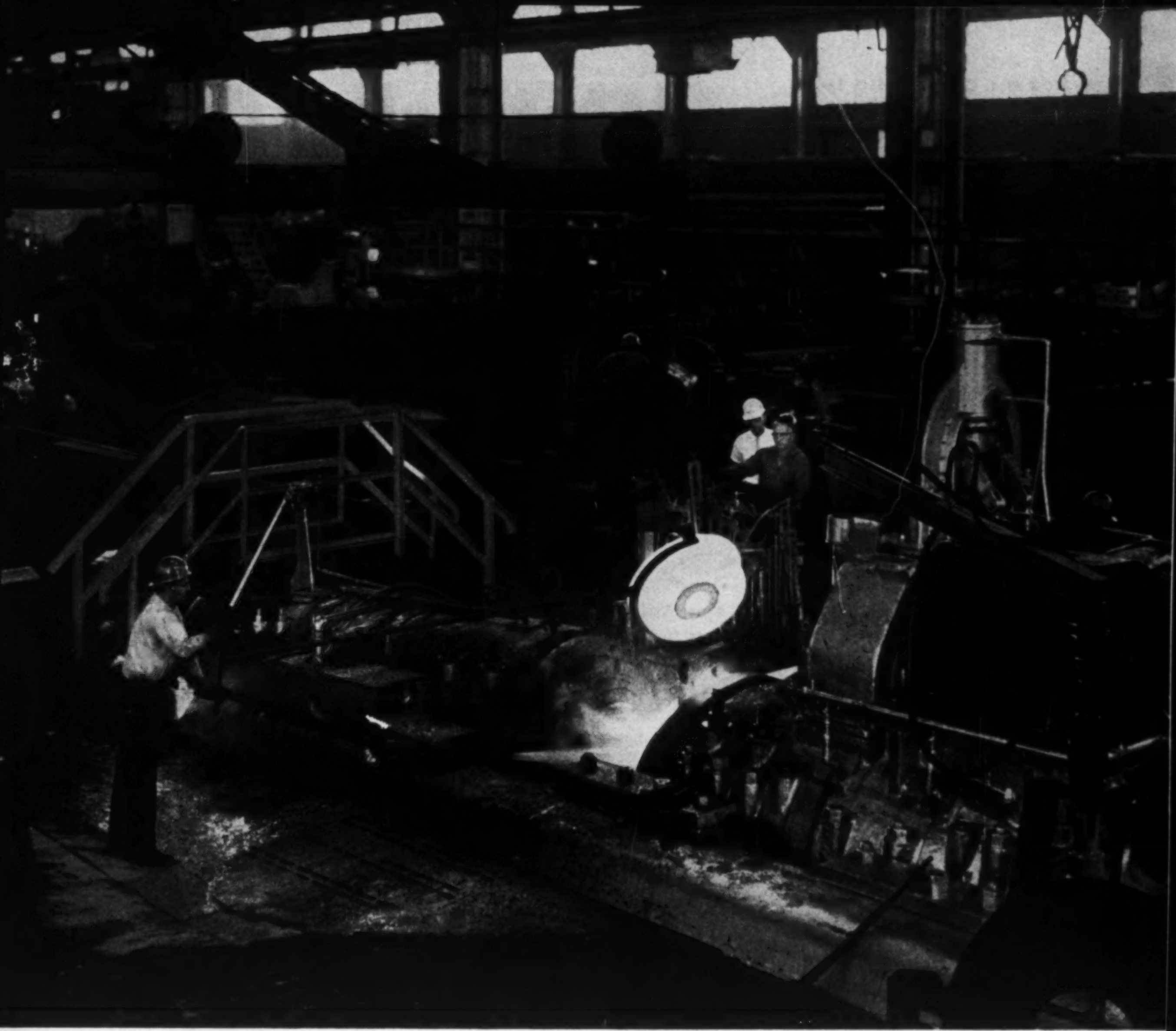

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The IRON AGE, published every Thursday by CHILTON COMPANY, Chestnut & 56th Sts., Philadelphia 39, Pa. Second class postage paid at Philadelphia, Pa. Price to the metalworking industries only $2 for 1 year, $3 for 2 years in U.S. Canada $10, all others $15 for one year. Latin America $25. Other foreign $35. Single copies 50¢. Annual Issue $2. Cable: Chilton Philadelphia.

IRON AGE

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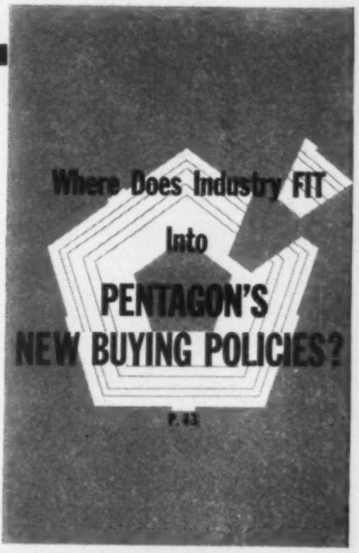
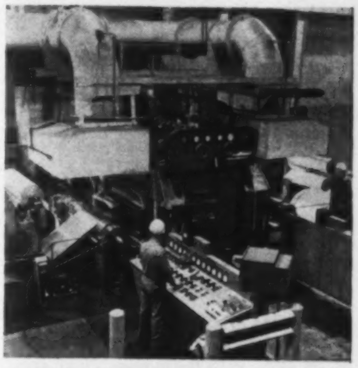


Defense Buying Undergoes Change

Pentagon procurement policies, long plagued by duplication and massive red tape, are getting a much-needed shot-in-the-arm. But the sudden streamlining hasn't caught industry unaware. Many big companies are tooling up for the change. This week's Special Report shows what industry can expect. p. 43



Stainless Auto Trim Faces Test

Urged on by automakers, stainless mills are working to develop trim more resistant to corrosion. They have come up with five new alloys and several new processes. This winter's snow and salted roads will test success of these moves. p. 48

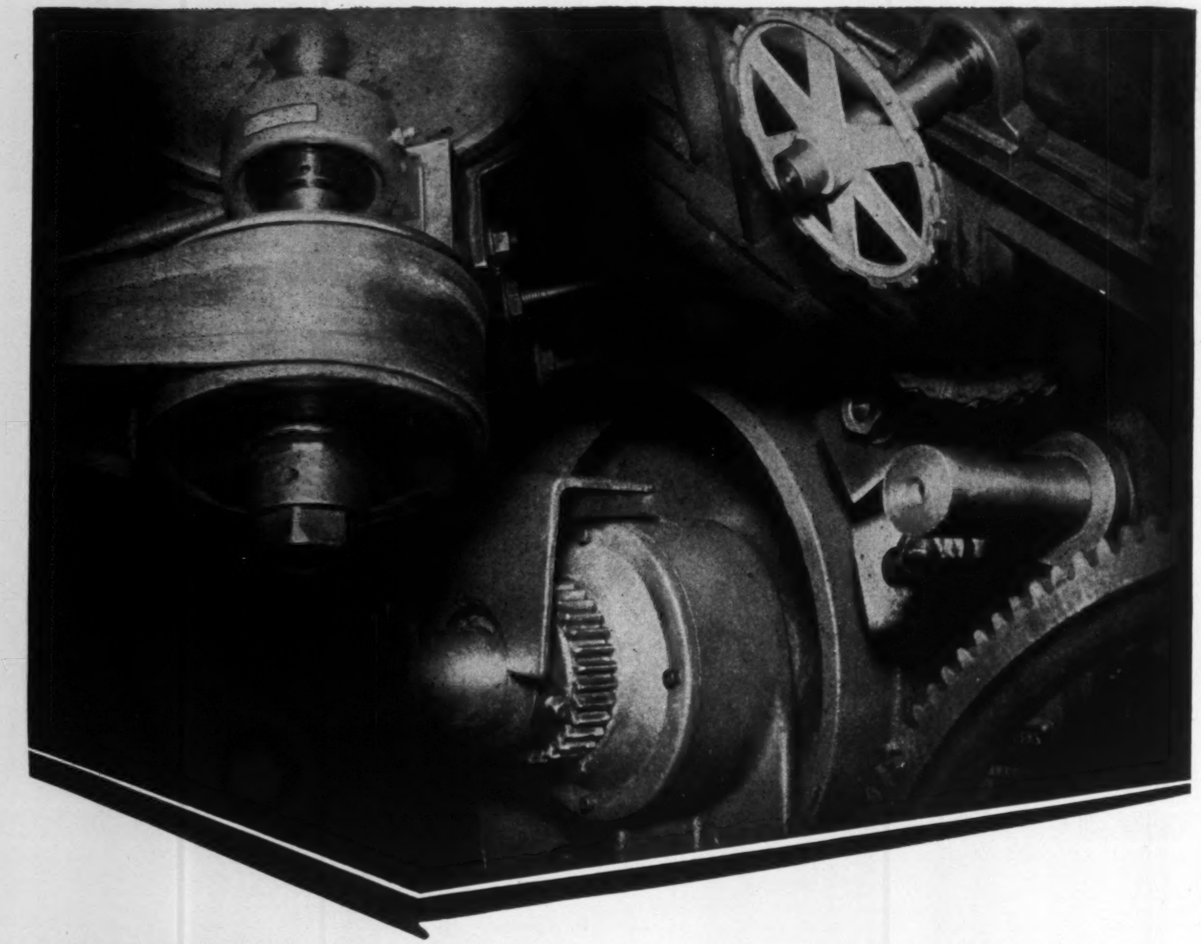
How to Divide Assembly Workloads

How much specialization can progressive-assembly lines take? Certain costs tumble as assembly stages are deskilled. However, this logic can be carried too far. Why not use your skilled labor to curb the waste in non-productive cycle lags? p. 73

Next Week

Will McDonald Miss Goldberg?

In next week's Special Report, Editor-in-Chief Tom Campbell discusses how the USWA will get along without Arthur J. Goldberg, now Secretary of Labor. (With Mr. McDonald, right, is David Feller, of Bredoff, Feller, and Anker, now USWA counsel.)



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EDITORIAL

The Prologue Is Out For the Steel Labor Follies!

The government, through President Kennedy, has warned steel management not to raise prices. Also, it has warned the steel union to go slow in its demands.

Management refused to commit itself on steel prices. But for many reasons no steel company has hiked its price of steel.

The union said, of course, it will not demand anything that would be inflationary or a deterrent to the price stability the White House seems to want.

Economists have again suggested that a no-price-no-wage-increase policy would be good for the consumer. It certainly would be. But if that happened, it sure would be novel—and quite unprecedented.

The steel industry is in a precarious position today. It faces rough competition from within and from without. Rugged competition from abroad is growing stronger. Lately, there is a tendency among those with money to lend to ask certain questions.

The latter is important. So much so that let's say the prologue this year to next year's labor Follies may be a prologue to a tragedy. The end result could be nationalization.

There is no reason to believe that the actual time schedule on the coming steel wage hassle will be different from the past. It may usher in a rugged battle the likes of which has not yet been seen.

There are good reasons why this is so. The major one is that the more resounding the prologue, the less the chances are of a quick and reasonable settlement.

There are a few reasons. Steel companies have their backs to the wall. They will have difficulty getting money for expansion unless their profit margin is better. That isn't good.

David J. McDonald, the Steelworkers' chief, has his back to the wall. He no longer has Mr. Goldberg as his mentor, bargaining ace, and boon companion for his goal, a big fat agreement.

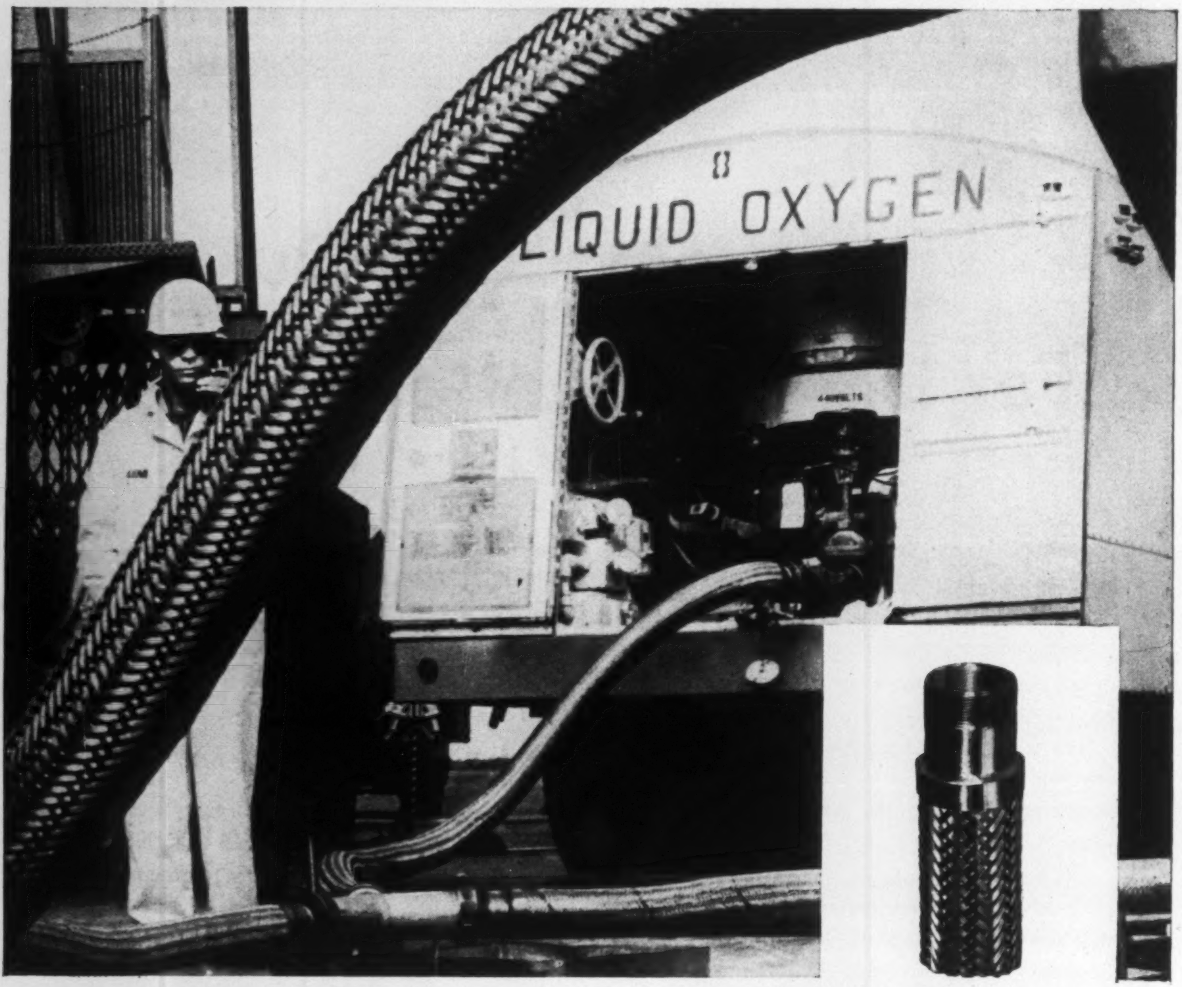
Also, Mr. McDonald has other worries. To name a few: Loss of membership, layoffs, the effect of automation, the last ditch stand by steel, and rank and file drive for job security as the principal issue.

The coming "Steel Labor Follies" should now be renamed "Struggle for Survival." That's what it may be for the industry, the union—and perhaps the nation!

Tom Campbell

Editor-in-Chief

3½ inch I.D. Anaconda flexible metal hose lines are shown here transferring liquid oxygen to Army missile. Brazed metal hose-to-fitting connections are made with Handy & Harman brazing alloys.



Handy & Harman Brazed Connections Withstand Thermal Shock From Liquid Oxygen . . . Time After Time

It is hard to think of a single more punishing test for a metal joint than the nearly instantaneous plunge from approximately 100° F to –297.4° F experienced by these brazed metal hose connections. Yet they take it time and again — and come back for more.

This is part of an assembly employing Type 321 stainless steel flexible hose made by Anaconda Metal Hose to transfer liquid oxygen to Jupiter missiles at the Redstone Arsenal. Fittings are stainless steel, integrally bonded to the hose by Handy & Harman brazing alloys—EASY-FLO and EASY-FLO 35 with Handy Flux. The reasons for using Handy & Harman brazing alloys here make good fabricating sense no matter what the job. First, they provide strong, integral joints that remain strong, ductile and resistant to vibration and shock even to liquid oxygen temperatures and pressures where many metals become brittle. Secondly, they allowed Anaconda to increase burst pressure limits since there is no annealing of the base metal. In addition, they make it possible for Anaconda to perform joining operations with less equipment and less expense in manpower than would otherwise be necessary.

This is only one example of many applications of Handy & Harman brazing products in cryogenics and other fields of engineering to solve critical bonding problems which achieve fast production and operating economies. There's a good chance they will do the same for you. Call or write for further information on how to apply brazing techniques to solve your fabricating problems. Our Bulletin 20 contains a wealth of data on silver brazing, its range of applications and techniques for securing best results. Write today for your copy.

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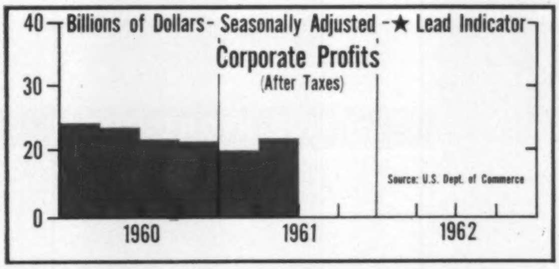
Profits Don't Reflect Recovery

General recovery gains are not reflected in corporate profits. Profits for 791 corporations dropped 5 pct from the first nine months of 1960, says First National Bank of New York. And third quarter profits were down 2 pct from the second.



Source: U.S. Dept. of Commerce

In manufacturing, profits topped 1960's third quarter by 7 pct but slid 5 pct from second quarter 1961. A projection of corporate after-tax profits would show a third quarter 1961 figure of $22.3 billion, down from $22.8 billion in the second quarter.

Profits cannot be expected to move up to any extent until "factory level" recovery is backed up more by "store level" recovery. As shown in retail sales on this page, this back-up is coming.

Forecast: Record Auto Sales

A better-than-average crystal ball points to a new record for auto and automotive parts sales in 1962. Prof. Daniel Suits, U. of Michigan economist, flatly forecasts a "better than 7 million car year."

And he predicts that spending for cars and parts will run at $21.5 billion. This is 5 pct greater than for the record year 1955, and 25 pct greater than estimated spending in 1961.

Prof. Suits, in making the forecast, used a mathematical model of the economy which he claims has not missed a turn in the nation's economy since first used in 1953.

The source of the big increase in 1962 auto sales is pent-up demand and liquid conditions of consumers.

Prospects Good, Executives Agree

Prospects for the first quarter 1962 look rosy to most business executives. At least this is true for more than 1000 businessmen surveyed in late October by Dun & Bradstreet.

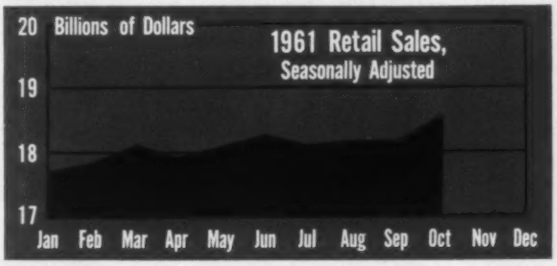
Most of the men say they expect an all-time high in sales volume, profits above present levels, a modest buildup in inventories, and higher prices in certain lines. Durable goods makers expect the best year-to-year gains.

One cloud drifting across the sunny survey findings: Prices. Executives feel greater price pressures, and most retailers and wholesalers expect to raise prices.

Retail Sales Turn The Corner

Retail sales in October may have turned a corner. They rose in the month to $18.6 billion. This is $400 million over September sales. And it is the second highest ever scored. The top retail sales month was April 1960 when $18.9 billion in sales were made.

Retail sales have lagged in the present recovery so the October gain is cause for real hope. This is especially true in view of the fact that auto sales were barely getting traction in the month.



If October is the month retail sales "turned the corner," then November or December will mark the month that sales make the "new breakthrough."

Balance of Payments Hit Hard

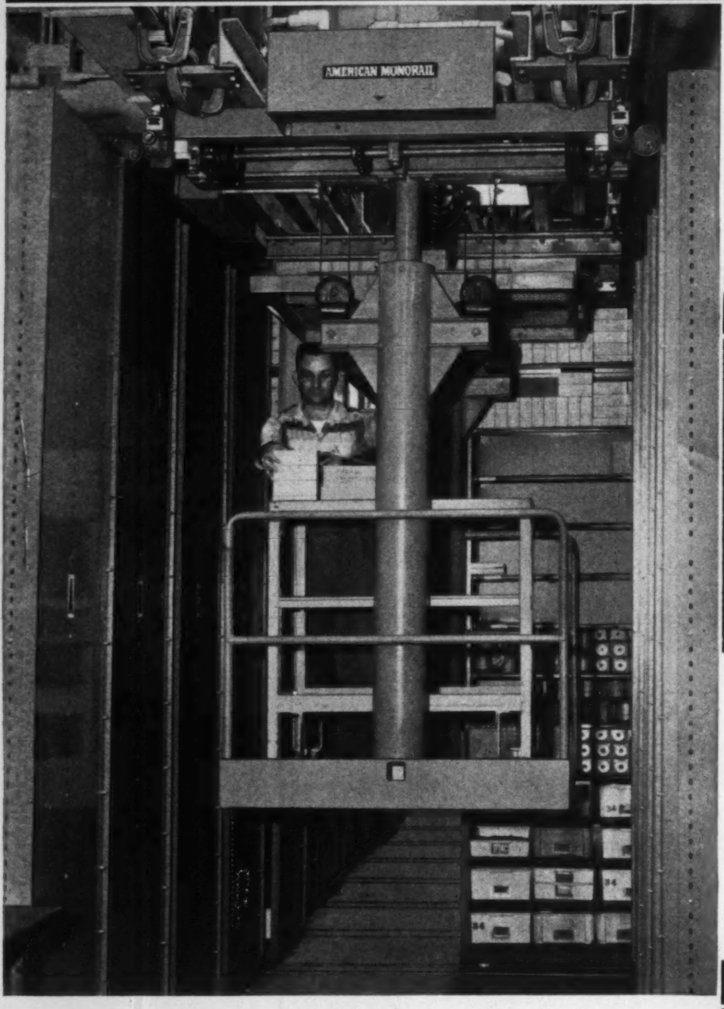
The U. S. paid out $800 million more than it took in during the third quarter this year. At an annual rate, this means unfavorable balance of payments of $3 billion.

This reversal of a second quarter trend is disappointing. But there may be one message of hope carried to U. S. industry in the glum figures. The need for changes in depreciation tax laws takes on a new urgency to the Administration.

A nation with an estimated 60 pct of all its machine tools over 10 years old is in no position to bring dollars back from the world trade arena. New depreciation laws are needed to spur U. S. companies to put new machines in their plants.

A favorable trade balance won't come through any dip in imports in the coming year. The President's Council of Economic Advisers has warned that the U. S. must expect an increase in imports as recovery gets under way further.

LOOK MA...NO AISLES!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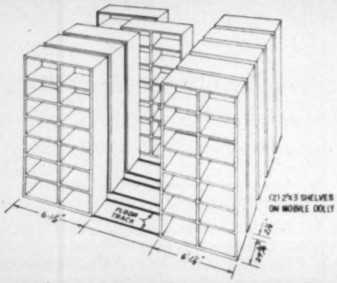
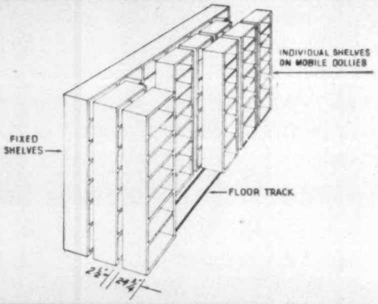

(2) 2'x3 SHELVES ON MOBILE DOLLY
6'-½"
FLOOR TRACK
6'1⁄8"
2'6
2'4

ACTIVE STORE ROOM


INDIVIDUAL SHELVES ON MOBILE DOLLIES
FIXED SHELVES
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2½"/24¾"

INACTIVE STORE ROOM

An American Monorail carrier plus mobile shelves added 7,500 sq. ft. of usable storage space to a Pennsylvania plant.

Ten foot high shelving units equipped with grooved wheel dollies ride on double rails mounted flush to the floor. Shelf units roll out into the aisle smoothly with a pull equal to 1% of their total weight. The Monorail carrier, used for loading and unloading shelves, has a photo cell safety device that prevents running into a shelf unit.

Major Benefits: Stock stays cleaner and the amount of space required for aisles is cut in half.

Free Folder — pictures and describes stacking by specialized American Monorail Stackers in many types of warehouses. Write for Bulletin SB-1.

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Unemployment Threat To Balanced Budget

Labor problems stand in the way of President Kennedy's plans for a balanced budget next year. With unemployment standing at about 4 million, it will be hard to cut spending that could remedy joblessness.

AFL-CIO President George Meany has already asked the President not to seek a balanced budget unless unemployment declines sharply. Mr. Meany says he is concerned that the President's commitment to a balanced budget could embarrass the Administration if more Federal spending is needed to stimulate the economy.

In a letter to the President, he wrote: "Budget deficits may very well be needed when unemployment is high and considerable amounts of productive capacity are idle."

NLRB Speeds Rulings

The National Labor Relations Board is bringing decisions through at a faster pace. It indicates that it cut its backlog from a record high of 466 cases to 402 during the month of October.

Key to the speedup appears to be the Congressional decision to allow NLRB regional directors additional powers in settling election cases filed after May 15 of this year. Last year it took 90 days to get a decision. The current rate is 44 days.

How Valid Are Employment Figures?

A private committee has been set up by President Kennedy to abate criticism of government employment statistics.

The President set up the committee of educators and economists at the suggestion of Labor Secretary Goldberg. Mr. Goldberg told the President that recent high unemployment had touched off controversy over the reliability of the statistics. The unemployment figure now stands near 7 pct of the labor force.

Mr. Goldberg says there is "a great lack of public understanding of this subject and much misinterpretation of the statistics themselves."

Goldberg Arrives, Settles Strike

Secretary of Labor Goldberg went to Cleveland last week for one of the White House regional conferences and ended up settling the biggest strike in town between sessions.

A strike of 1000 ironworkers had idled 1000 additional building craftsmen and tied up 100 projects for 37 days in northeastern Ohio. At issue was whether stewards should receive a full day's pay if work is interrupted by bad weather.

Mr. Goldberg persuaded them to drop the demand and, instead, get $5 per day extra for all workers who show up and are sent home. Wage payments were to be cash instead of check. Contractors wanted check payment but workers then wanted time off to cash checks.

The Secretary of Labor participated at the request of local Congressmen and labor representatives.

Issues Deep at Y&T

It's a fact of life of labor relations that unions will fight to the death to preserve two things: Work rules and the prerogatives of union officials.

This is the situation at the Philadelphia plant of Yale & Towne Manufacturing Co. where violence and bitterness characterize a strike that has been on since Aug. 31.

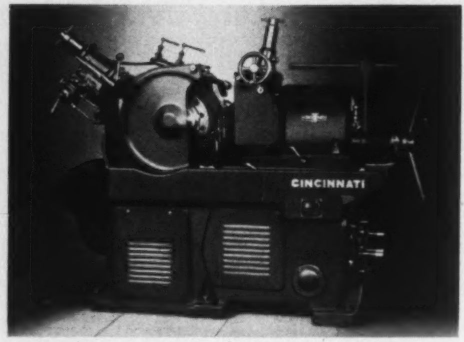
The unions involved, Local 1717 of the International Assn. of Machinists and Local 14 of the Office Employees Union (both AFL-CIO) were further irked by an unusually tight injunction restraining picketing.

As a result, the unions charge "Boulwareism," and contend that "money is not the issue; survival is." The company had offered a 21.5 cent-per-hour, three-year package.

The company contends a sharp decrease in productivity over the past several years must be reversed. It wants "more responsible union statesmanship" and wants to limit the time spent by some union officials on union business during working hours.

Grievance procedures are especially under attack, but the union says this is a front for removing union representation from incentive workers. The union claims management wants to increase accepted work rates and block other payment procedures based on past agreements.

The company cites the falling work rate and says there must be a fair day's work for a fair day's pay. Another issue is a revised departmental seniority system under which the company would avoid mass bumping by confining it to a single department. The union says senior employees would be hurt by this policy.



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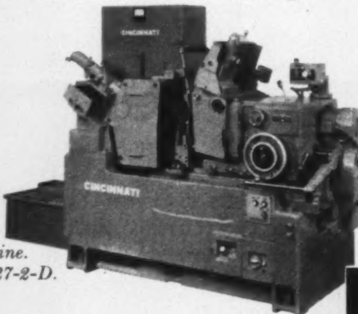
FAST TAPER ADJUSTMENT. It's no longer necessary to re-true for proper grinding wheel contact on thru-feed, or to correct taper on infeed operations. You simply adjust at front of machine *without* disturbing alignment of workblade, guides and regulating wheel. Also reduces setup time. A great time saver!

MANY MORE COST-REDUCING FEATURES. Up to 20″ wide grinding wheel—fewer passes, more economy. Hydraulic grinding wheel reciprocation for better finish on infeed jobs. Ball slides for high precision adjustment, minimum wear. Differential handwheel adjustment to .000050″. Infinitely variable regulating wheel speeds. Power profile truing. Many others.

EXCEPTION. One feature of your old CINCINNATI Centerless is *not* obsolete—the Filmatic grinding wheel spindle bearings. This is the only feature on which we've not been able to improve. These bearings require neither adjustment nor maintenance, they are highly accurate and apparently last forever. After 23 years, we've repaired only 0.1% of the many thousands in use!

If you care about costs and competition, you'll call in your Cincinnati representative right away. Ask him about the special trade-in proposition we're offering to make it easy to replace those old CINCINNATI Centerless Grinders.

Remember, everything about your old CINCINNATI Centerless is obsolete. Everything, that is, except its Filmatic bearings and its great reputation. The Cincinnati Milling Machine Co.,Cincinnati 9,O.



New CINCINNATI Centuramic 220-8 Centerless Grinding Machine. Ask for Publication No. G-727-2-D.

CINCINNATI PRECISION GRINDING MACHINES:

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CINCINNATI®
GRINDING MACHINE DIVISION

By R. W. Crosby

★ More Credit Insurance?

A new government-controlled credit insurance program to protect businessmen against financial risk when competing with foreign companies will be suggested in Congress next year.

Senate Democratic whip Hubert Humphrey thinks that some new form of government credit insurance will help spur American industry to compete harder for foreign dollars.

Though the form of this insurance has not yet been determined, the idea has gained support from powerful Congressmen on both sides of the political aisle. Sen. Eugene J. McCarthy (D., Minn.) and Sen. Homer E. Capehart (R., Ind.), support the idea.

Sen. McCarthy, a member of the Senate Finance Committee, says such a credit insurance proposal could be offered as legislation next year. Sen. Capehart, top GOP member of the Senate Banking Committee, says "for years" he has been in favor of a government-backed credit insurance program to protect American businessmen against risk.

Sen. Humphrey says he will propose the risk guarantee plan to President Kennedy along with other new trade steps. Humphrey says the insurance program might be modeled along the lines of government programs insuring housing mortgages.

One question which arises is how will this credit insurance program conflict with the insurance against commercial and credit risks on exports offered by the Export-Import Bank? So far, the answer has not been supplied.

Competition with firms abroad which get up to 90 pct risk insurance from their governments started Sen. Humphrey thinking along these lines. He believes U. S. firms must be able to compete with foreign firms in terms of credit from the government.

■ Mansfield Will Push For Copper Cartel

Senate Democratic Leader Mike Mansfield intends to pursue his plan for an international copper cartel. The Montana Senator made the proposal earlier this year as a move to stabilize copper production and prices.

The U. S. Interior, Justice and Commerce Dept. have been studying the proposal. So far they have been silent on the plan.

Sen. Mansfield regards an international agreement on copper prices as the only way to solve industry problems. Though he is opposed in principle to cartels, he says: "In this case it's the only way I can think of to create a steady price structure, steady employment and steady production on a year-round basis."

■ Congress to Study State Taxation

The problems of state taxation of business are getting attention in Washington. Commerce Secretary Luther Hodges says state taxes "are pyramiding percentage wise far more than the federal government (taxes)."

A Congressional group is preparing to take a look at how far states can go in taxing interstate commerce. In theory, states and local governments leave taxation of goods in interstate commerce to the Federal government. But the line between what is and what is not interstate commerce is often blurred by conflicting interpretations. Rep. Edwin Willis (D., La.), is chairman of a House Judiciary Subcommittee that will explore the problem next month.

■ Does Defense Dept. Give Away Patents?

A dissenting voice from the Pentagon claims the Defense Dept. is giving away patents to private industry. The voice is that of Vice Admiral Hyman Rickover, characterized as "The Navy's one-man Army."

Adm. Rickover made his dissent before a Senate Judiciary Subcommittee last summer behind closed doors. His testimony was just made public.

RICKOVER: Let's keep patents.

Adm. Rickover, talking on the controversial question of who should own government-financed patents, believes the government generally should demand patent rights in any inventions developed by private industry with government funds.

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WHY DESIGNERS DO A "DOUBLE-TAKE" ON TORRINGTON SELF-ALIGNING BALL BUSHINGS

This Self-aligning Ball Bushing is designed for tough work...takes misalignment in its stride while supporting the heaviest radial, thrust or combined loads. Even low frequency oscillating operation can be accommodated.

Self-aligning ball bushings, so simple and inexpensive, are often overlooked. Take a look at Torrington's for the best solution to many misalignment and heavy loading problems.

Both the ball (inner ring) and the mating, spherically ground outer ring, are made from bearing quality steel. The outer ring has a cylindrical O.D. to permit normal mounting. Oil holes and grooves permit relubrication through either shaft or housing.

You'll find the Torrington Self-Aligning Ball Bushing is the most effective answer to tough, heavy-duty problems. For details, call or write us today.

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Series SBB
(for industrial applications)

All surfaces phosphate coated and treated with dry film molybdenum disulphide lubricant.

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Free World Market Proposal Pushed

First talks between Britain and Common Market ministers have ended in Brussels.

The experts started working this week to prepare for the second official sessions, early in December. As expected, Commonwealth trade and the common external tariff is the big hurdle facing Britain's bid for Common Market membership.

Meanwhile, an idea that originated in the U. S. has found favor in Britain. Harold Wilson, chairman of the Labour Party, endorses the proposal for an Atlantic Community Common Market. It would include Free World nations in Europe, as well as Canada and the U. S. (See IA, Nov. 16, p. 13).

"A Common Market on an Atlantic Community basis could be established," says Mr. Wilson. "Provided that the Commonwealth were part of it, I believe it would have many advantages for England which we could not hope to secure on the basis of a much more limited Common Market in Europe."

Chief problem of today's Common Market continues to be a growing labor shortage. A report to the European Economic Community cites difficulties of most member countries in balancing supply and demand in the labor market.

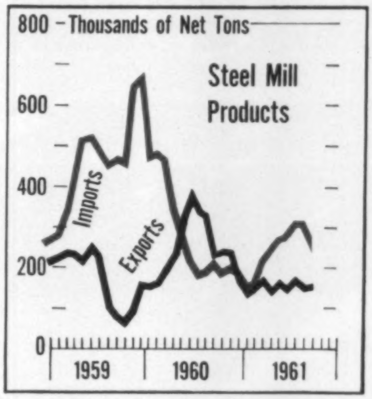
The report predicts the labor shortage will grow more acute in Germany and the Netherlands. Shortages in France and Luxembourg will continue. Only Belgium and Italy have reserves adequate for future needs, but there may be shortages in certain categories of skilled workers.

The report suggests action to improve the labor situation. This includes: Decentralization of industry; vocational retraining; and accelerated recruitment of foreign labor. Coordinated labor policies is the main step urged for Common Market members.

Steel Imports Drop After Steady Climb

U. S. imports of steel mill products, which had been rising steadily since January, dropped 12 pct in September. And exports increased 10 pct.

September imports totaled 269,000 net tons. This is 38,000 tons below August, but 62,000 tons higher than September, 1960.



Imports were the lowest since May. Total for the first 9 months is 2.2 million tons, valued at $266 million, compared with 2.8 million tons valued at $371 million in the same period of 1960.

Barbed wire imports accounted for 53 pct of the total new supply available in the U. S. in the first 9 months. Wire nails accounted for 41 pct, and concrete reinforcing bars, 18.5 pct.

Exports of steel mill products totaled 165,000 tons in September. This is 15,000 tons over August, but 63,000 tons less than sales in September, 1960.

For the first 9 months, exports totaled 1.4 million tons, valued at $301 million.

U. S. Urged to Boost Japanese Imports

The U. S. should encourage, rather than discourage, greater imports from Japan.

This is the view of Prof. Stewart Rewoldt, of the University of Michigan. He has just completed a year of study in Japan.

"It is to our advantage to keep the Japanese strong economically," says Prof. Rewoldt. "We can best do this by encouraging sales of their products here."

He cites these reasons: 1. A strong Japanese economy makes better customers for U. S. products; and, 2. The stronger Japan becomes, the more likely it is to assume some of the present U. S. foreign aid burden in the Far East.

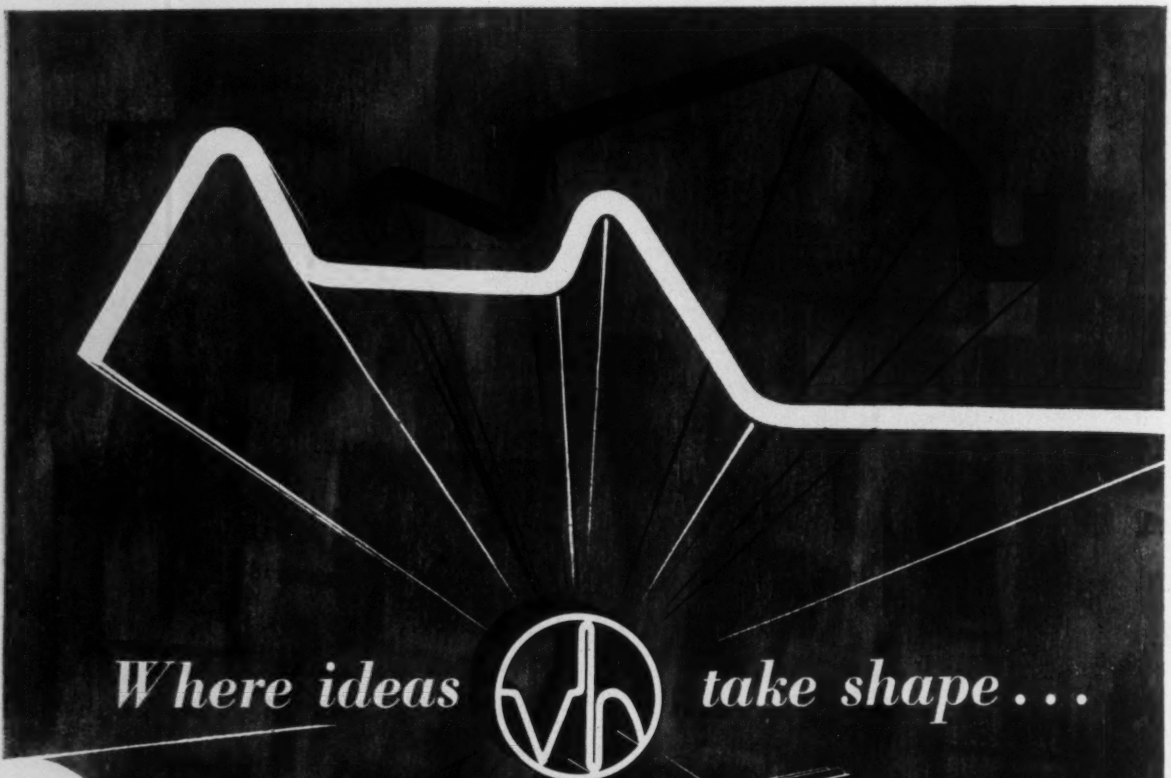
"We are selling almost $1 billion more in goods to the Japanese than we are buying from them," Prof. Rewoldt adds. He points to heavy U. S. exports of scrap metal and coking coal.

And if the U. S. reduces trade with Japan, it would look to Communist China and other Communist bloc countries for markets.

U. S. Would Answer Russian Challenge

The U. S. has asked the Western world to increase its economic output 50 pct by 1970. The production hike is designed to answer Russia's economic challenge to the Free World.

The plan was unveiled by G. W. Ball, undersecretary of state for economic affairs, to a Washington conference of the new 20-nation Organization for Economic Cooperation (OECD). It would step up the combined gross national product of OECD nations from about $866 million to $1.3 billion annually by 1970.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WHATEVER YOU MAKE IN METAL . . . there's a good chance you can profit by Van Huffel's half century of experience in roller die, cold forming shapes to any lengths . . . in a wide variety of metals . . . from forming dies designed and built in our own plant. The free 48 page handbook gives you the complete story. Write for it today.

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shapes

VAN HUFFEL TUBE CORPORATION

WARREN • OHIO

Gages 0.0001-in. Tolerance

Electronic gaging is chalking up new gains in precision for ball-bearing producers. Teamed up with automatic grinding equipment, a new machine control unit consistently holds tolerances of 0.0001 in. With digital readout and a non-contacting head, the setup grinds bearing race faces to size for a specified preload. Digital readout precludes interpolation errors.

Improved Leak-Test Method

The Navy has developed a new method for detecting leaks in all items which would be damaged by the common vacuum-over-water test. The device under test is placed inside a pressurized tank. If the device leaks, air seeps inside it, causing an overall pressure drop in the test tank.

Packaging Breakthrough

Precision assemblies are being packaged by a new injection molding method. This technique will handle mechanical equipment as large as a jet engine. Here's how it works. Polyurethane foam is squirted into the bottom half of a box. Then the engine is lowered into the partly-hardened foam. When the top of the box is in position, foam is sprayed on the top half of the engine. That's all there is to it. But weight is cut in half; container size decreases from 73 to 31 cu ft; and cost nosedives from $340 to $50.

Thermoelectric News

RCA has recently announced the development of a new thermoelectric material. Laboratory tests indicate that a 1-sq ft surface, heated to about 1800°F., could produce up to 10 kw of electricity. This is nearly three times the amount of power consumed in the home at any given time.

Future for Nuclear Blasts

According to an expert, possible peacetime uses of nuclear explosions include: Removal of overburden from mineral deposits; breaking up material under the ground to ease extraction; production of dams and reservoirs for power generation; and building harbors and canals for shipment of remotely located natural resources. There's also the possibility of transforming iron-ore deposits into granular metallic particles by means of mass underground chemical reactions. These particles could then be readily melted into pig iron.

Measures From a Distance

More accurate than the pulse-echo method of sonar, a new ultrasonic measuring device gages distance, deflection or speed of a remote object. No physical contact is necessary. In fact, the instrument can be placed anywhere from a fraction of an inch to 100 ft away from the object being measured. Present units are accurate to 0.001 in. But the developer says accuracies to a few ten-thousandths present no difficulties. Accuracy is independent of the distance involved.

Stepup in Steelmaking

One Canadian mill is turning out steel at the rate of 100 tons an hour in large openhearths. An American mill is now averaging up to 70 tons per hour. These aren't full shop averages. But they do represent sustained commercial performance and not just a few test heats. The American mill is charging scrap rapidly, using 1500 cu ft of oxygen per ton of steel produced.

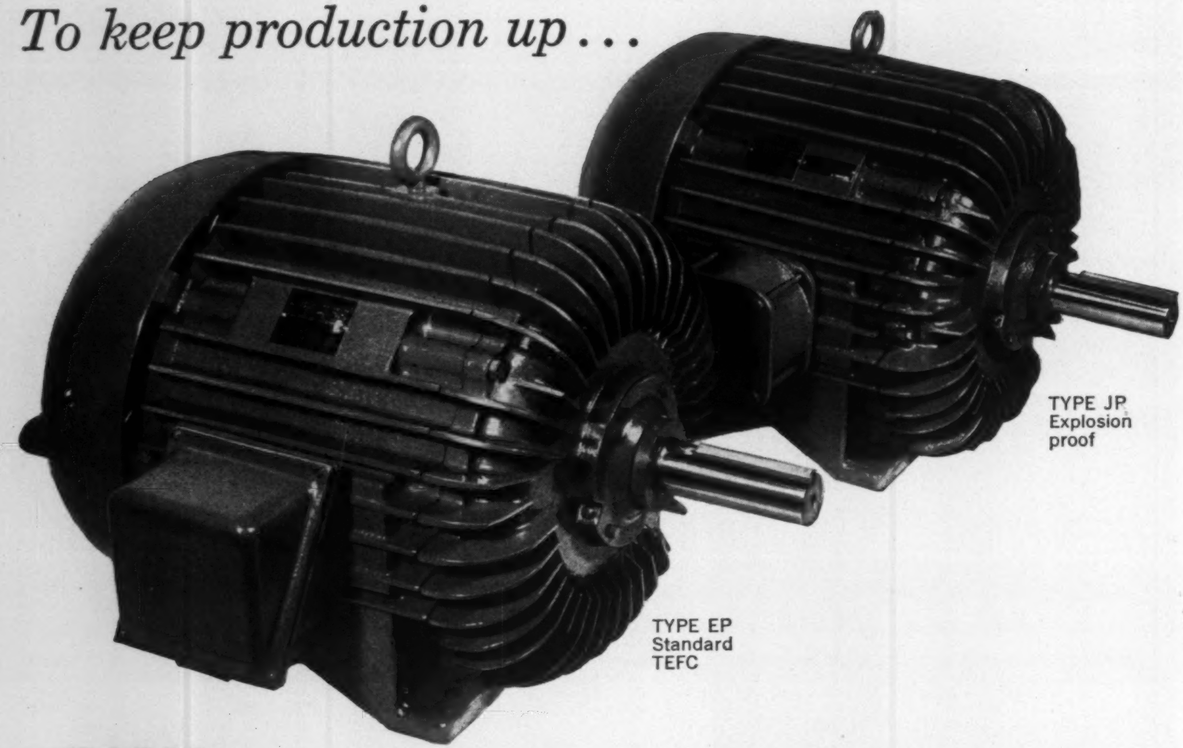
Tells How Plastics Break

More uses for plastics may result from a new measuring device. It's giving scientists a better understanding of the way different plastics break under extreme impacts. Conventional testing machines measure only the total breaking energy of a plastic sample. The new tester takes a photo which shows how the sample responds to a striking blow. It records the force as the plastic bends, yields and breaks, all in a fraction of a second.

Bearing of the Future?

Weighing in at about 1,000,000 lb, the Hale telescope is completely supported by hydrostatic bearings. A tiny 1/12-hp motor supplies all the power needed to rotate the telescope as it follows the path of the stars. Because of the hydrostatic bearings, the coefficient of friction for this high-load, slow-speed application is only 0.000004.

To keep production up . . .



TYPE JP
Explosion
proof

TYPE EP
Standard
TEFC

PICK FROM THIS PROTECTED PAIR...

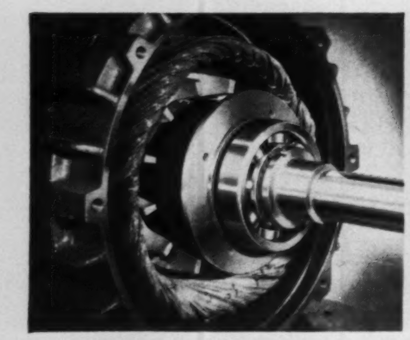
Here's a power-packed pair of Wagner® totally-enclosed fan-cooled motors —Type EP, standard, protected against damage from dust, abrasive, fumes, steel chips or filings; and Type JP, explosion-proof, for safe use in specified hazardous locations.

They'll keep your production rates up, delivering full rated horsepower under the toughest conditions . . . staying on the job with dependable, continuous service that means peak output. They're the perfect pick, for individual machines or for automated lines.

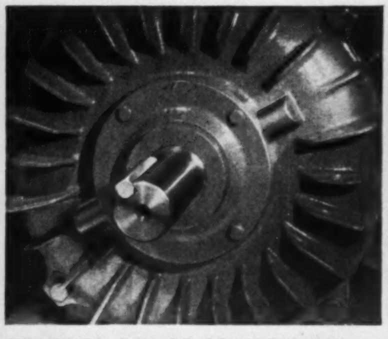
In the design illustrated, these motors are built in ratings through 100 hp in NEMA frame sizes 182-445U. Let your Wagner Sales Engineer show you how this protected pair (or larger Wagner enclosed motors through 500 hp) gets the job done. Call him, or write us for Bulletin MU-224.

Wagner Electric Corporation
6403 PLYMOUTH AVENUE, ST. LOUIS 33, MISSOURI

WH60-19



HEAVY-DUTY BALL BEARINGS . . . The ball bearings used in these motors are of the highest quality, with more than ample capacity to provide long, troublefree service under heavy loads.

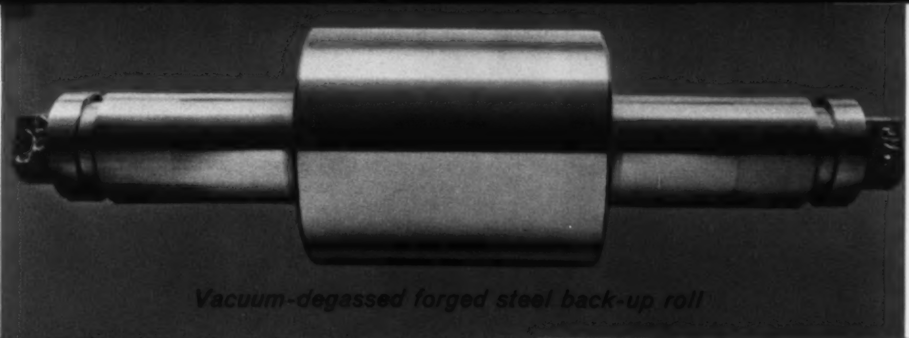


BEARINGS CAN BE RELUBRICATED . . . Factory lubrication will last for many years under normal service, but openings are provided to permit relubrication that adds years to motor life under severe conditions.

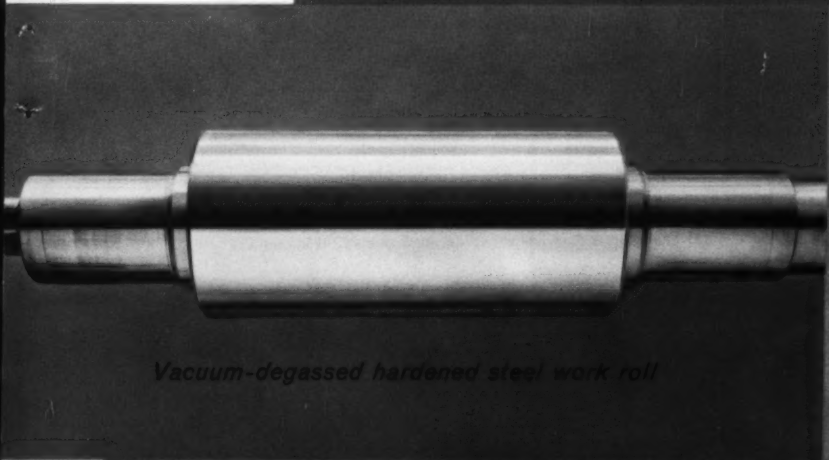
SECURELY SEALED FOR LOW MAINTENANCE . . . Both ends of these motors have running shaft seals to keep the bearings clean. Bearing housings are effectively sealed to prevent escape of grease.

Steel

for Strength
. . . Economy
. . . Versatility



Vacuum-degassed forged steel back-up roll



Vacuum-degassed hardened steel work roll

Forged steel back-up roll sleeve

Cast iron back-up roll sleeve

NEW!

Bethlehem iron sleeves for temper mills

Bethlehem cast iron back-up roll sleeves have proved themselves for over six years in Bethlehem's own temper mills. Now we're making them available to everybody. They're an important addition to our line of top-quality rolls and sleeves for temper and cold-reduction mills.

BETHLEHEM STEEL

BETHLEHEM STEEL

Pouring iron for sleeve into chill mold.

GET MORE TONNAGE FROM TEMPER MILLS

with Bethlehem cast iron back-up roll sleeves

Grinding bore of cast iron sleeve.

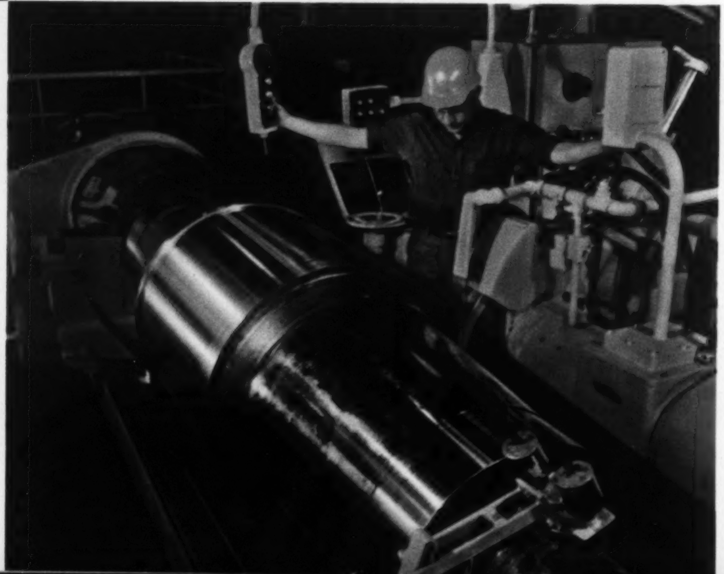
Over the past six years, we've produced many of these iron sleeves for our own temper mills. They've averaged 340 per cent more tons production on sheet temper mills than previous sleeves . . . 300 per cent more tons production on tin temper mills. Not one has split. Not one has slipped.

Most rolling mill people agree that *iron* back-up rolls on temper mills produce more tonnage than any other kind of rolls. Practically all blackplate, and tinplate mills use them; so do many sheet mills. Since there's less "build-up" on iron rolls, you don't have to grind as often (which cuts downtime) . . . or remove as much per grind (which lengthens service life).

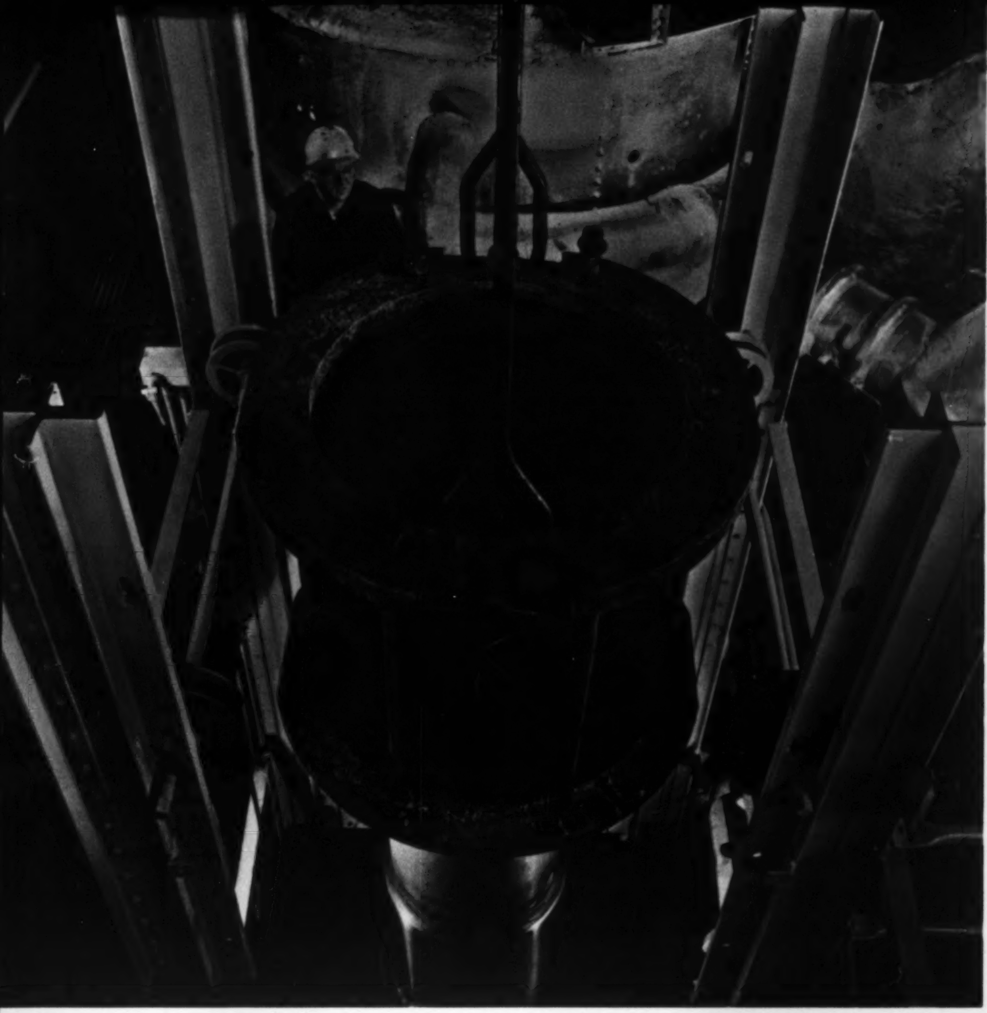
But not everyone agrees on which kind of iron back-up roll to use. The *one-piece* cast iron back-up roll? Or the cast iron back-up roll *sleeve*?

The iron sleeve gets our vote

Back in 1955, Bethlehem pioneered the development of a cast *iron* sleeve mounted on a *steel* arbor. This combines the best of both—the best possible working surface with the best possible



Grinding steel arbor with shrink allowance.



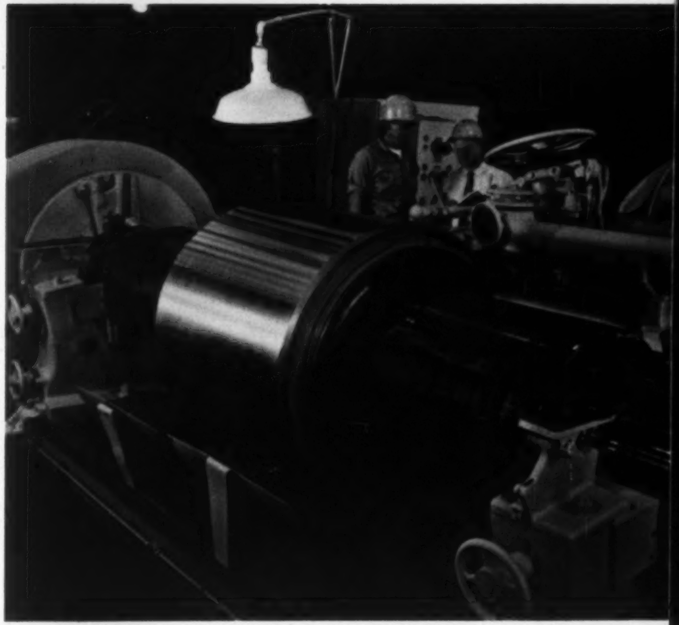
Here the holding device with cast iron sleeve is being lowered onto steel arbor. Sleeve is first heated to about 500 deg in order to expand bore. Then it is lowered, as shown. When the sleeve cools and contracts, it forms a tight "shrink fit."

neck strength. It's also a lot less expensive to mount a cast iron sleeve on an existing steel arbor than it is to buy a new one-piece cast iron back-up roll.

But let us hasten to add that if you now use one-piece cast iron back-up rolls, *and have found the neck strength adequate*, you've also got a fine opportunity to re-sleeve with a Bethlehem iron sleeve. And at a nice savings, too.

Fast delivery . . . attractive prices

You can count on good delivery of Bethlehem iron sleeves. And the price is right. For more information about Bethlehem cast iron back-up roll sleeves—and how they increased production on our own temper mills by 300 per cent and more—call or write the Bethlehem sales office nearest you. Or write to us at Bethlehem, Pa.

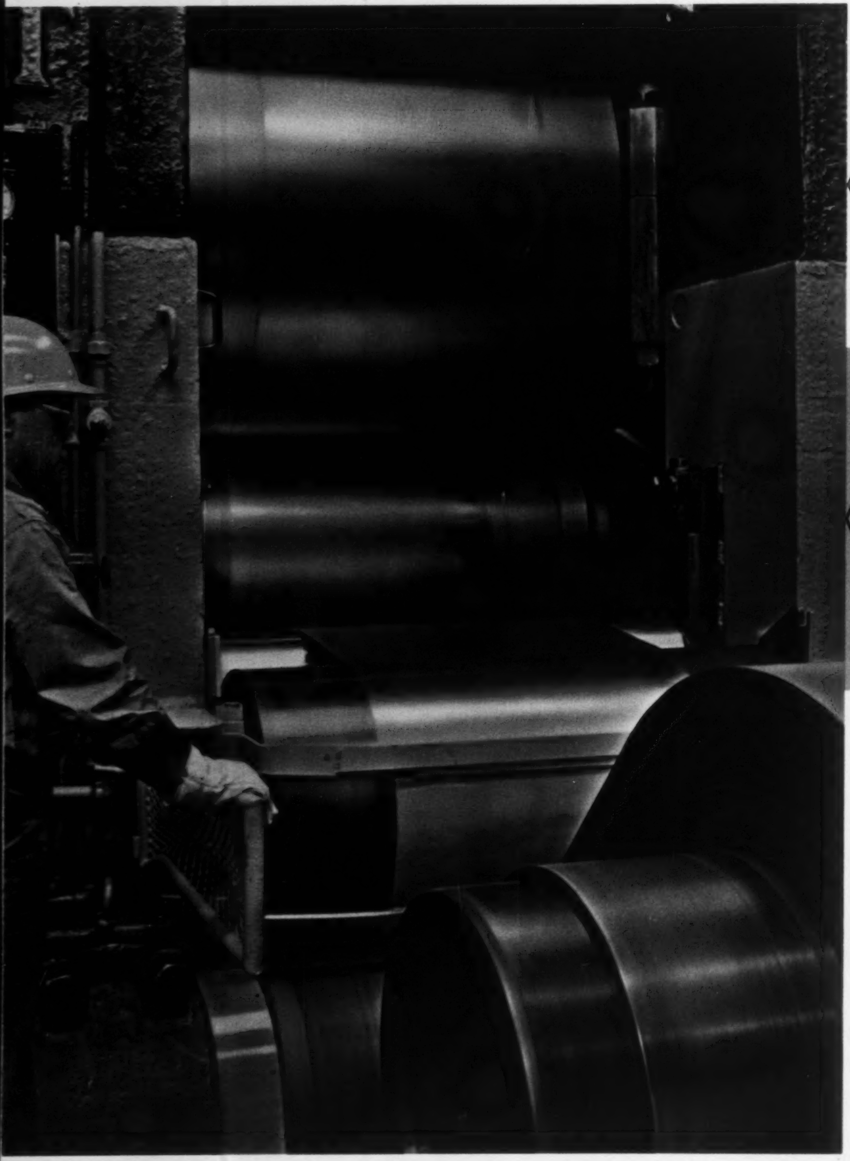


Finish grinding of the cast iron roll sleeve-and-arbor assembly.

BETHLEHEM STEEL

BETHLEHEM STEEL

TOP-TONNAGE TEAM FOR TEMPER MILLS



Bethlehem cast iron back-up roll sleeve

In our own mills, they've averaged 340 per cent more tons on sheet temper mills than previous sleeves . . . 300 per cent more tons on tin temper mills.

BETHLEHEM
VACUUM-DEGASSED
HARDENED STEEL ROLL

Bethlehem vacuum-degassed hardened steel work roll

These hardened-and-ground forged steel rolls minimize the hazard of roll breakage, increase production. Forged from vacuum-degassed steel . . . from steel that is sounder, tougher, and cleaner than air-cast steel. Deliveries are excellent. And there's no price extra!

BETHLEHEM STEEL COMPANY,
BETHLEHEM, PA.

Export Sales:
Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Knudsen Rebuttal

Sir—In the Sept. 28 issue, Pontiac's K. E. Knudsen infers that the reason General Motors and the rest of the industry are putting out over 400 different automobile types this year is that the industry does not know what the public wants. Yet, later in the article he agrees with a statement that every family will own a stable of cars, presumably one for every specialized need.

Such an approach will be another insidious step towards the affluent society of status seekers working with a glittering shell surrounding mediocrity.

It's time the automobile people realized that all the public wants is one lasting quality product at a reasonable price—not four inferior ones. They cannot give this and tool up for 400 different models. The current approach to building automobiles is to create the greatest natural resource "waste maker" in the world.

The current administration blames the steel industry for creating inflation. Yet what the auto industry is creating is far more insidious; namely, an economy based on creating consumer spending for poor quality material designed to turn into a piece of cancerous junk inside of two or three years. The auto industry does only a mediocre job of this—why not create a product that would last only a year? Then everyone would have to buy a new car each year.—Name withheld on request.

What Was That?

Sir—Reading your excellent editorial of Nov. 9 on "The Lost Art of Listening: Let Us Bring It Back Again," I'm reminded of a recent interview with S. J. Perelman, noted humorist, recorded in the Sunday book section of the "New York Herald Tribune."

Asked what was most wrong with the world today, Perelman responded that no one listens to anybody anymore. He overheard two men in rapid-fire and almost simultaneous conversation on the street.

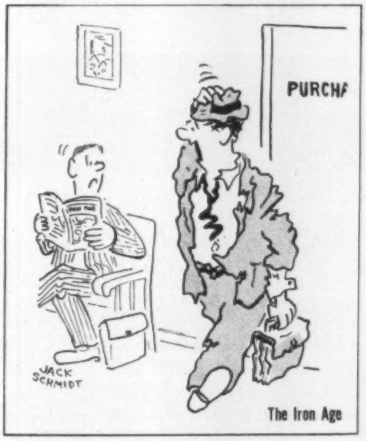
The first man said, "I think so-and-so is definitely schizophrenic." The other replied, "You're absolutely right. He just doesn't think things through."—Raymond J. Councell, administrative assistant, George P. Byrne, Inc., New York, N. Y.

Strong Leadership

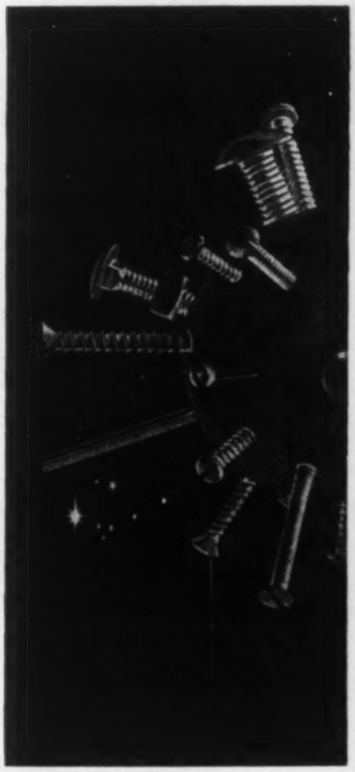
Sir—I have just received the Nov. 2 issue of your fine magazine.

My sincere compliments to you for a very strong and effective editorial policy. Your articles are to the point, comprehensive and written so that any American can understand the basic problems that face America today.

It is encouraging for us, who cannot be so effective, to see you take this strong leadership to conserve the United States. Keep up the good work!—Robert K. Koelling, president, Koelling Universal Joints, Inc., Dallas, Tex.



"He's tough today!"



IF you're making plans for a new model or new product, soon to be launched into sales orbit, let Southern fasteners help assure its success. Sales, in great part depend on quality fasteners that hold your product together.

Southern specializes in the manufacture of quality fasteners made in USA with USA materials. Build quality into your products with Southern fasteners.

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In snow or mire, they reach the fire

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FWD Fire Engines feature power and traction on all four wheels to assure maximum fire-fighting reliability . . . they go where the fire is.

VR-65 TRIPLES TOOL LIFE ON FWD FRONT AXLE BALL ASSEMBLIES

- ***Increases tool life 300%***
- ***Speeds cutting 200%***
- ***Eliminates lapping and polishing***

Cutting the spherical radius of FWD's front axle ball assemblies imposed four difficult machining conditions — (1) a drop from 900 to 450 SFM, (2) two interrupted cuts, (3) a 63 micro-inch, or better, finish requirement and (4) a Brinnell hardness of 230-270. The superior edge strength of VR-65 has more than met these tough conditions. This is why FWD Corporation, Clintonville, Wisconsin chose V-R. It is why more and more plants are making V-R their first choice. To learn how V-R's complete line of cutting tools can help you, call your V-R man today.
VASCOLOY-RAMET CORPORATION,
810 Market Street, Waukegan, Illinois.

V-R **FIRST CHOICE of more and more plants**

C-859

FATIGUE CRACKS

The Test of Time

Iron Age has been around for a long time. In a few weeks we'll bring out our 107th annual issue.

During that time, many close reader contacts have been formed. But, generally, we don't hear about them. That's why we're gratified to receive this letter from P. W. Hussey, president, Hussey Mfg. Co., North Berwick, Maine:

The Busy '90's — "Gentlemen: You may be interested in this. Last night I came across an old diary kept by my uncle William Hussey in 1890. At that time he with my father and another uncle were partners in the Hussey Plow Co.

"An entry in that diary reads something like this: 'A busy day so in order to properly read the Iron Age I came back to the office for a while this evening.'

"That was 71 years ago and some of us have had your publication all this time."

Thanks for your comments, Mr. Hussey. We know present-day executives take Iron Age home to catch up on the latest in metalworking. But it's nice to reflect that it's a habit which goes back many, many years.

Mobile Marvel

We've always known that man is far from perfect. It comes home to us every time we try to put in the storm windows or assemble those complicated toy kits for the youngsters.

But where man fails, science has the answer. The latest development is a mechanical man for use in industry and science. This "Little Ranger" was designed by the electronics group of General Mills, Inc.

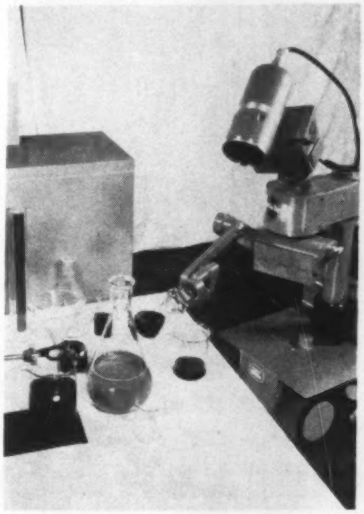
Daring Unlimited—According to General Mills, it can go through many of the motions of a human being, perform many of the actions a human being performs, and others that a human cannot, or dare not, perform.

The Little Ranger is adapted for use in remote or dangerous areas. It can move through restricted openings, work within confined limitations, and is immune to radiation and most other hostile environments.

Here is why the device is so flexible: It's composed of three major elements—a mechanical arm, a telescoping mast to which the arm is attached, and a mobile steel chassis incorporating a system of multigroove tracks and fixed drive pulleys.

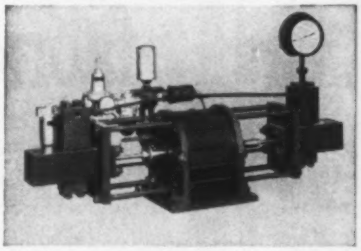
Speed, Muscle, and Skill — All motions are electro-mechanically controlled. Little Ranger can turn within a 40-in. diameter circle. It can work at both slow and fast speeds. What's more, it can pull a load of about 800 pounds, move over obstacles, and climb a 25-degree slope at 58 feet a minute.

Mechanical arms, General Mills adds, work untiringly. And, it might be added, they don't have habits like disappearing for long coffee breaks.



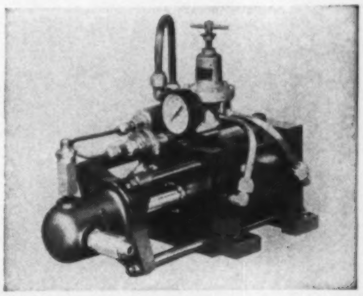
DELICATE TOUCH: Mobile remote handling system developed by General Mills, Inc., pours liquid as its TV "eye" watches.

Need reliable hydrostatic testing to 50,000 psi?



Ordinary pumps just won't do. To handle fluids at pressures up to 50,000 psi and beyond, it takes the rugged dependability of an Aldrich heavy-duty, 6" stroke pump. Powerful yet compact, this unit is the right answer for high pressure equipment on production lines or in the laboratory.

Service—hydrostatic testing of tubing, valves, pressure vessels; operation of hydraulic presses, cylinders, valve positioners. Available single or double acting.



For intermittent service and pressures to 36,500 psi, the Aldrich 3" stroke pump is ideal, offers low first cost, high reliability.

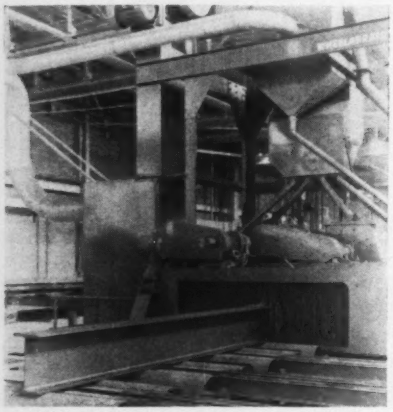
Both these Aldrich Air-Driven Hydraulic Pumps operate on normal plant air, are readily installed and economical to run. Immediate shipment from factory stock. Write for Data Sheet No. 36 (6" stroke) and No. 36A (3" stroke). Aldrich Pump Company, 8 Pine St., Allentown, Pa.

ALDRICH
SUBSIDIARY OF INGERSOLL-RAND

Wheelabrator® blast cleaning cuts costs for structural fabricators

Airless abrasive blast cleaning of structural steel to "white metal" before fabrication is a proven cost-cutting step. Many leading fabricators are now Wheelabrator cleaning all their steel prior to fabrication, and getting the advantages of more rapid and positive inspection, reduced layout time, faster, better welding and flame cutting, and greatly reduced housekeeping costs. Such fabrication cost savings more than repay the $1.50 to $2.00 per ton cleaning cost. Equally important, the end product is improved. Wheelabrator-cleaned steel takes a better, longer-lasting finish, reducing maintenance costs on the finished structure. Such multiple benefits and savings are another example of how Wheelabrator delivers the

VITAL VALUES



The Wheelabrator in this structural fabricating plant handles all shapes and plate, including I-beams and angles, in lengths up to 60'.

VITAL VALUES FOR INDUSTRY

WHEELABRATOR

AIRLESS BLAST EQUIPMENT

WHEELABRATOR CORPORATION, 510 S. Byrkit St., Mishawaka, Indiana, In Canada, WHEELABRATOR CORPORATION OF CANADA, LTD. 1901 Birchmount Rd. P.O. Box 490, Scarborough, Ontario

A subsidiary of Bell Intercontinental Corp.

COMING EXHIBITS

Chemical Industries Exposition—28th Annual, Nov. 27-Dec. 1, New York City Coliseum.

Canning Machinery & Supplies Show—Jan. 21-24, Americana Hotel, Bal Harbour, Fla. Assn. headquarters, 4630 Montgomery Ave., Washington.

MEETINGS

NOVEMBER

American Society of Mechanical Engineers—Winter annual meeting, Nov. 26-Dec. 1, Statler-Hilton Hotel, New York. Society headquarters, 2 E. 48th Street, New York 17.

Plumbing Brass Institute — Annual meeting, Nov. 27-29, Savoy-Hilton Hotel, New York City.

American Management Assn.—Materials conference, Nov. 27-29, Savoy-Hilton Hotel, New York City. Assn. headquarters, 1515 Broadway, Times Square, New York 36.

American Institute of Steel Construction — Annual meeting, Nov. 27-30, Boca Raton Hotel, Boca Raton, Fla. Institute headquarters, 101 Park Ave., New York.

National Assn. of Corrosion Engineers—Regional corrosion conference of the Southeast Region, Nov. 27-Dec. 1, Key Biscayne Hotel, Miami, Fla.

DECEMBER

Malleable Founders Society—Semiannual meeting, Dec. 1, Hotel Sheraton-Cleveland, Cleveland. Society headquarters, 781 Union Commerce Bldg., Cleveland.

National Federation of Independent Scrap Yard Dealers, Inc.—8th annual convention, Dec. 1-3, Barbizon-Plaza Hotel, New York City.

American Institute of Chemical Engineers—54th annual meeting, Dec. 3-6, Hotel Commodore, New York. Institute headquarters, 25 W. 45th St., New York.

(Continued on P. 26)

Fastest Draw In The West!

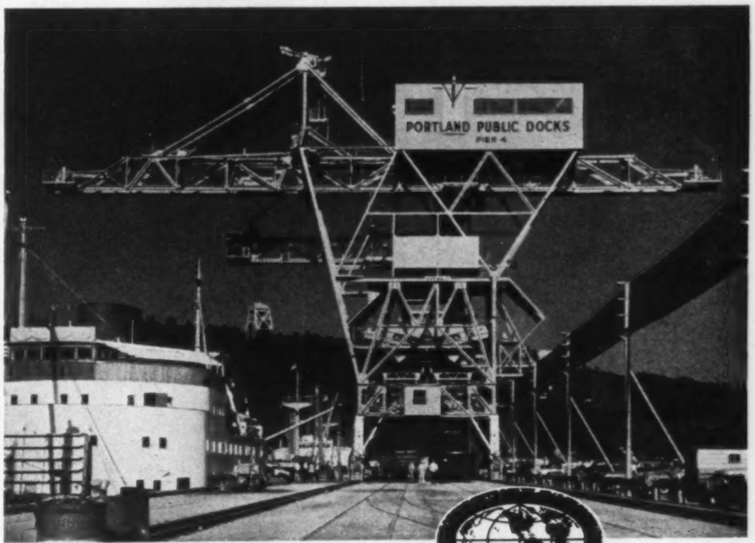
And what a draw Portland's giant new straight-line bulk unloader furnishes . . . 900 tons-an-hour—the only facility of its kind on the Pacific Coast.

Backed up by a 140-car rail yard and huge open storage space, Portland's new unloader provides the cheapest and fastest transfer from deepwater ship to domestic carrier. It will handle all types of vessels —all types of dry bulk cargoes.

If you import dry bulks—or are in the market for an industrial plant site with access to a high-speed bulk discharging pier—set your sights on Portland Harbor where YOU pocket the savings from modern cargo handling!

FOR HIRE IN PORTLAND, OREGON

Send for Complete Information!



WRITE: Sales-Traffic Department

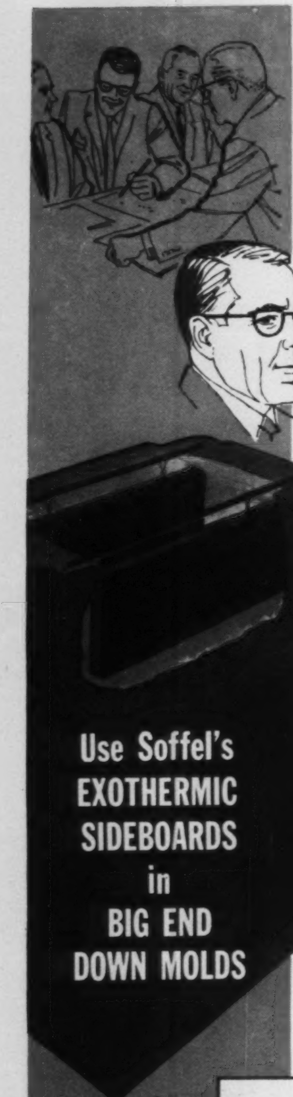
PORTLAND PUBLIC DOCKS

3070 N.W. Front Ave.
Portland 10, Oregon
CA 8-8231
Cable (DOCOM)
TWX PD309U

or Eastern Office

PORTLAND PUBLIC DOCKS c/o BUCKLEY & CO.
170 Broadway, New York 38, N.Y. TWX NY1-2578

STEEL PRESIDENT reports:



Soffel's EXOTHERMIC SIDEBOARDS

"increase production and lower overall costs. Profits reflect the superiority of this method of pouring alloy and all grades of steel."

Yes, experience in pouring hundreds of heats of steel using Soffel's Exothermic Sideboards in the heads of Big End Down molds shows significant benefits are derived. First, increased ingot yield of sound top cut steel; second, lower labor costs at the pouring platform and in reduced track time; third; increased slab yield; fourth, more out the door product.

You'll be happier with your profit picture when you see the results of using Soffel's Exothermic Sideboards in your melting operations.

Give them a fair trial soon.

PRODUCT ADVANTAGES

- Eliminate permanent and conventional hot tops.
- Easy, and single, stripping of Big End Down molds.
- Sideboards are easily placed in head of mold by one man — crane only necessary on very large ingots.
- Longer mold life — less mold cost — less mold inventory to carry.

Soffel's Exothermic Sideboards increase ingot yield, assure top cut soundness and provide more ton steel out the door per ton of steel in the ingot.

Phone NAtional 5-1571

Pittsburgh Metals Purifying Co.
A Division of Treesdale Laboratories, Inc.
MARS, PENNSYLVANIA

MEETINGS

(Continued from p. 25)

Electric Overhead Crane Institute—Annual meeting, Dec. 5, Carlton House, Pittsburgh, Pa.

Spring Manufacturers Assn. — Annual meeting, Dec. 5-6, Biltmore Hotel, New York. Assn. headquarters, Box 1440, Bristol, Conn.

National Assn. of Manufacturers—Annual meeting, Dec. 5-7, Waldorf-Astoria Hotel, New York. Assn. headquarters, 2 E. 48th Street, New York 17.

American Ordnance Assn. — 43rd annual industrial preparedness meeting, Dec. 6, Waldorf-Astoria Hotel, New York. Assn. headquarters, Mills Bldg., Washington, D. C.

Materials Research Conference—Rensselaer Polytechnic Institute, Dec. 18-19.

Metallurgical Society of AIME—19th Electric furnace conference, Dec. 6-8, Penn-Sheraton Hotel, Pittsburgh.

JANUARY

Assn. of Consulting Management Engineers, Inc.—Annual business meeting, Jan. 15, University Club, New York. Assn. headquarters, 347 Madison Ave., New York.

Mining Symposium—University of Minnesota and Minnesota Section, AIME, joint meeting, Jan. 15-17, Duluth Hotel, Duluth, Minn.

Steel Plate Fabricators Assn.—Annual meeting, Jan. 15-19, Mountain Shadows Hotel, Scottsdale, Ariz. Assn. headquarters, 105 W. Madison St., Chicago.

Aluminum Assn.—Annual meeting, Jan. 24-26, New York.

Associated Equipment Distributors—43rd annual meeting, Jan. 28-Feb. 1, Hilton Hotel, Chicago.

Society of Plastics Engineers—18th annual technical conference, Jan. 30-Feb. 2, Penn-Sheraton Hotel, Pittsburgh.

★★★ the new and better galvanized steel sheets

Do you have a job that requires top quality galvanized steel sheets? If so, our LEONITE sheets are just what you need. Our fully integrated and modernized strip mills and Sendzimir continuous galvanizing line are working at full capacity to produce superior corrosion-resistant LEONITE galvanized steel sheets. There is an ever-increasing overseas demand for LEONITE because it has a special-processed non-flakable zinc coating which makes it ideal for deep drawing. It is widely used for building material, ducts, furnaces, automobiles, refrigerators and numerous other household appliances.

This is just one integral part of NKK's mammoth enterprises. As the Orient's largest steel producer engaged in both steelmaking and shipbuilding, NKK's 30,000 engineers, specialists and workers are producing high-quality steel products.

NKK

NIPPON KOKAN K.K.
Otemachi, Chiyoda-ku, Tokyo, Japan

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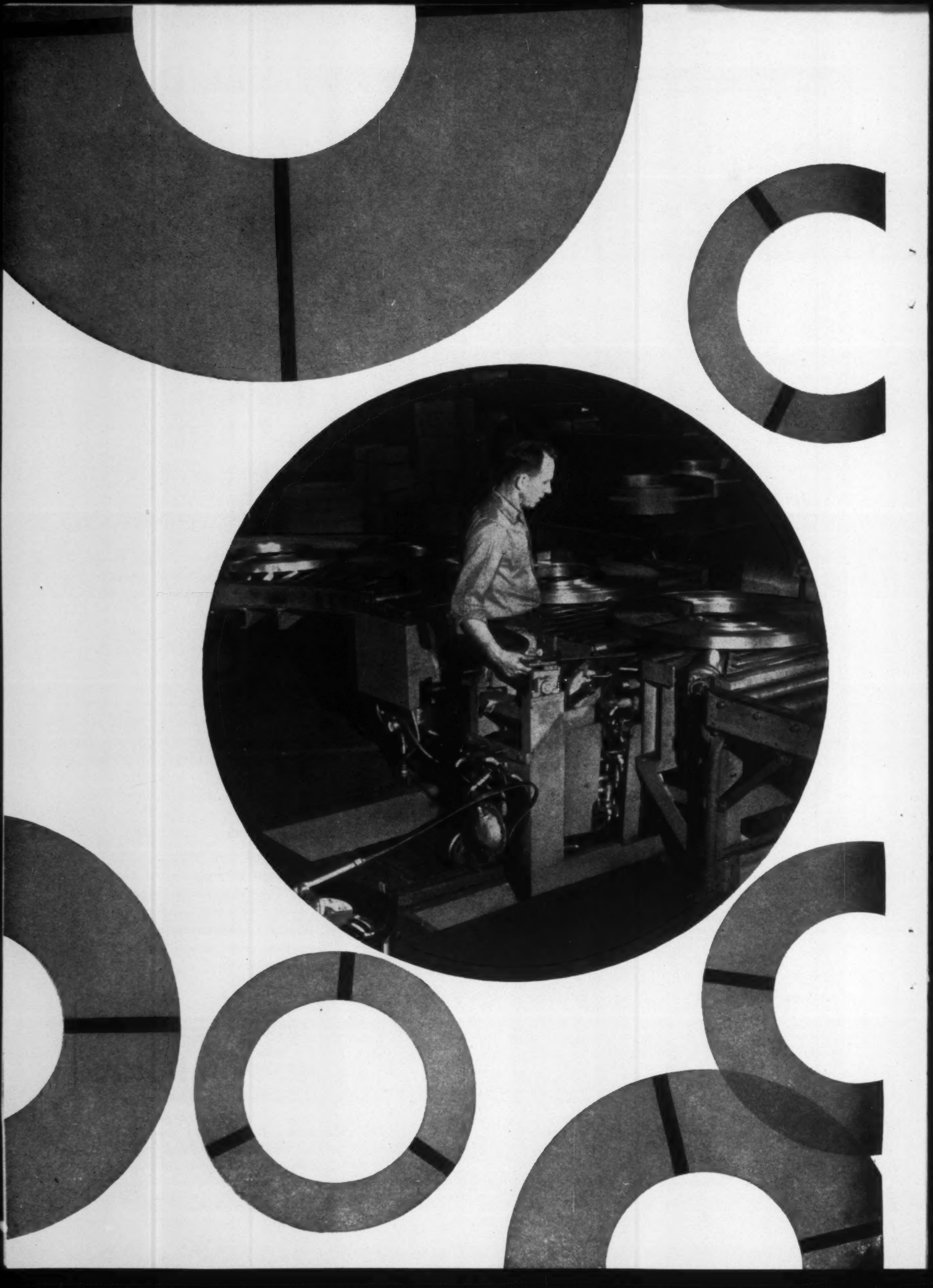
■ **New York:** Rm. 1115, 39 Broadway, New York 6, N.Y., U.S.A. ■ **Düsseldorf:** Kreuzstrasse, 34 11, Düsseldorf, West Germany ■ **Singapore:** Rm. 414, Shaw House, Orchard Road, Singapore



ACME STEEL MACHINES STRAP CIRCLES AROUND ANY OTHER METHOD

In the slit coil field alone, dozens of producers are proving that Acme Steel automatic strapping systems are the most productive partner slitting equipment ever had. For instance, the new F4 Strapping Machine and Indexing Table (at left) let one man completely strap as many as 150 coils *of any width* per hour—all through push-button control. And once secured, coils are unitized just as efficiently with Acme Steel portable powered strapping tools.

Thanks to this rapid, non-stop flow, existing slitting equipment can run *continuously* at full capacity, eliminating the need for investing in additional slitting lines in many instances. No wonder Acme Steel automatic strapping equipment can pay off in 18 months!

No field has a monopoly on these savings. Acme Steel equipment is scoring unparalleled productivity gains in strapping giant hot coils, paper, textiles, products and packages of every description . . . in bundling and unitizing such products as lumber, building materials, bar stock, pipe and sheet metals.

Full facts on industry's most proven and productive strapping systems are as close as your phone. Call your Acme Idea Man for an evaluation of your particular operation. Or, clip the coupon for case studies.

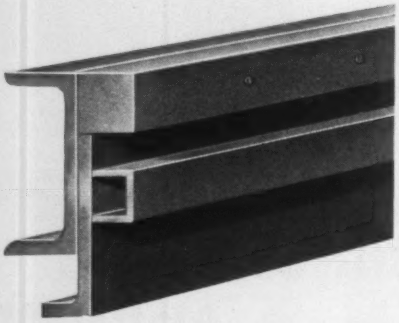
ACME STEEL IDEA LEADER IN **STRAPPING**

ACME STEEL COMPANY
Dept. IFS-111, 135th & Perry Ave.
Chicago 27, Ill.

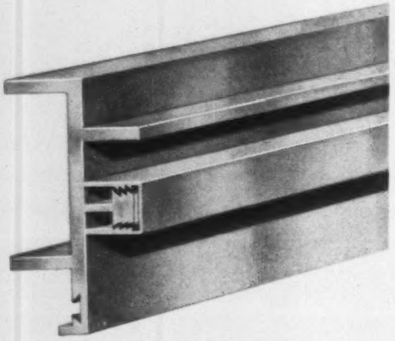
Please send me detailed information illustrating how major companies in my field use Acme Steel Strapping.

*Name*____________________
*Title*____________________
*Firm*____________________
*Address*____________________
*City*__________ *Zone*____ *State*______

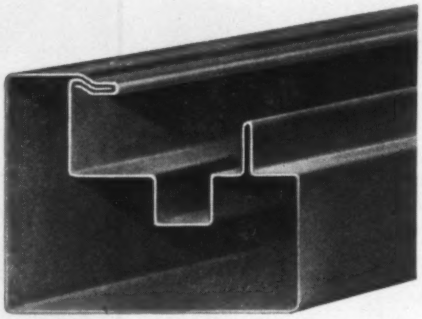
Have your components



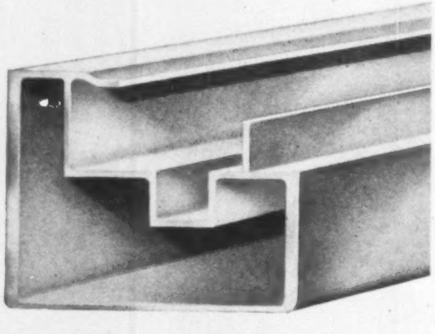
BEFORE: four standard shapes assembled to form a complex unit.



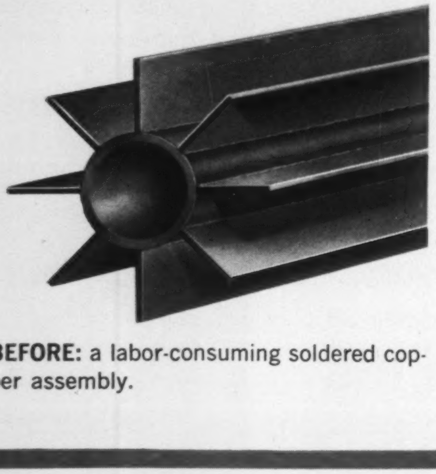
AFTER: two extruded shapes snap into place, saving time, eliminating fasteners.



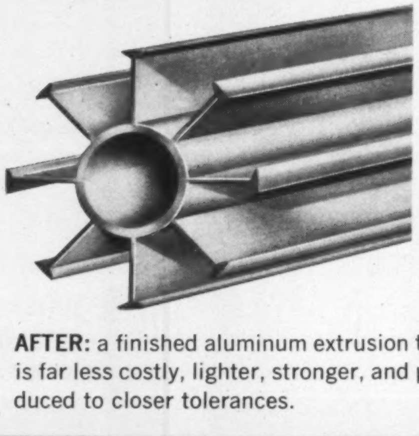
BEFORE: a roll-formed steel sheet.



AFTER: a stiffer, stronger aluminum extrusion with closer dimensional accuracy . . . design flexibility . . . and lower costs.

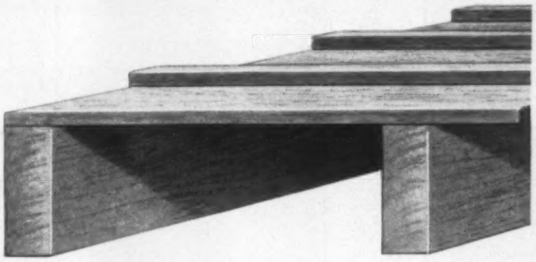


BEFORE: a labor-consuming soldered copper assembly.

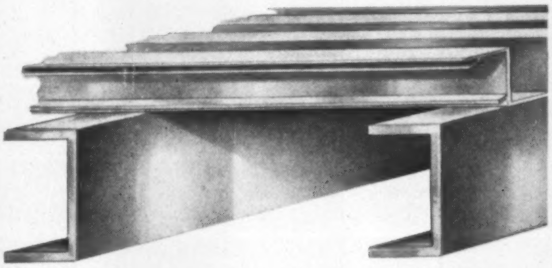


AFTER: a finished aluminum extrusion that is far less costly, lighter, stronger, and produced to closer tolerances.

had their yearly checkup?



BEFORE: friction rails . . . deck . . . crossbeams . . . all of wood.



AFTER: extrusions of light, low-cost, rotproof, splinterproof aluminum do the job. Hollow rails make cooling or heating easy.

MORE AND MORE companies have consulted extrusion specialists . . . and switched from rolled, crimped, welded, machined or assembled parts to cost-cutting aluminum extrusions.

Have an independent extruder analyze your product line right away—and regularly from now on. The chances are excellent that he can help make major cost savings.

Production techniques and aluminum alloys have improved rapidly over the last few years. That is why it takes a specialist—an experienced extruder—to keep up with all of the many cost-saving possibilities that aluminum extrusions now offer.

It's always good business to know your nearby independent extruder . . . a specialist supplied with top-quality aluminum ingot by Aluminium Limited.

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Aluminium Limited Sales, Inc., 111 W. 50th St. New York 20, N. Y.

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Please send me a list of Independent Extruders in this area.

Name____________________

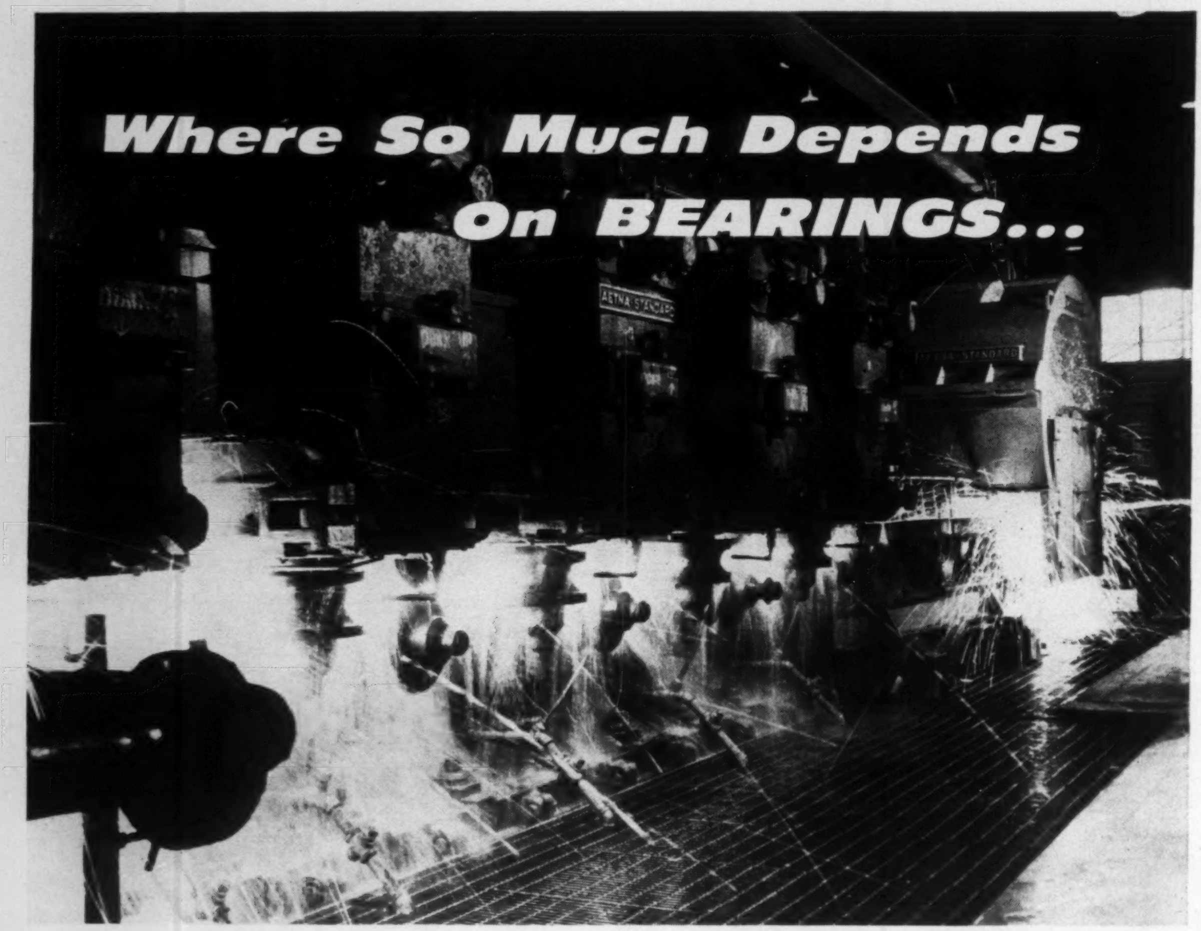
Title____________________

Company____________________

Address____________________

City____________State________

IA-11



Where So Much Depends On BEARINGS...

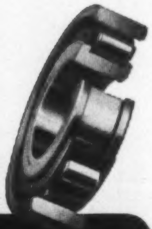
Rollway Bearing - equipped pipe - forming and welding stands at J & L Aliquippa Works. Rollways are also used in other equipment at Aliquippa, including cranes, crane hooks and mill motors.

It Pays to Depend On ROLLWAY

The addition of two Continuous Weld Pipe Mills has greatly increased Jones and Laughlin's monthly production of welded pipe. The mills have operated since 1957.

Both mills are Rollway Bearing-equipped, as are J & L's Stretch Reducing Mill and Electric Weld Tube Mill, installed at the same time.

Operations like these demand component reliability. Dependable Rollway Bearings regularly provide it. You can choose from a complete selection of sizes and types with maximum capacities. Consult Rollway's nearest Engineering Office to select the bearing just right for your job. Or start by writing for Product Line Catalog PL-559. Rollway Bearing Co., Inc., Syracuse, N.Y.



You can depend on

ROLLWAY BEARINGS

Radial and Thrust Cylindrical Roller Bearings

ENGINEERING OFFICES: Syracuse • Boston • Chicago • Detroit • Toronto • Pittsburgh • Cleveland • Seattle • Houston • Philadelphia • LosAngeles • SanFrancisco

THERE IS A SERVICE-PROVED UNITED® ROLL FOR EVERY ROLLING APPLICATION

STEEL ROD
STEEL STRIP
PAPER
RUBBER

United Rolls . . . Ask any steelman and he'll tell you those words are almost as common to him as gauge and reduction. You'll get a similar response from the men who roll paper and rubber.

Service-proved United rolls have been on the job for more than 50 years—longer than the age of many of the men who rely upon them today for precise trouble-free rolling.

Behind each United roll application stands United's service engineers, metallurgists and roll makers. They have a wealth of experience, knowledge and skill. That's why United rolls set the quality standards for the industry.

1901 1961
Progress... Leadership United for Sixty Years

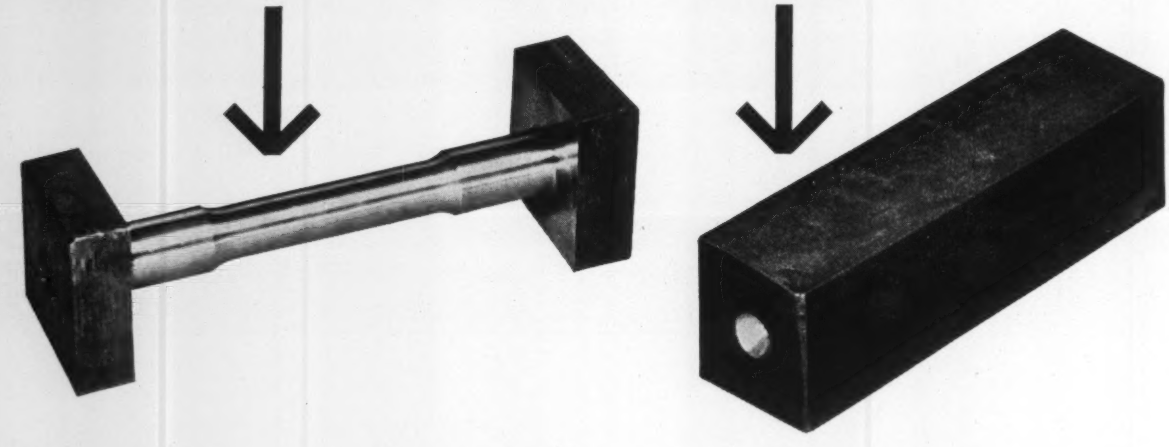
Plants at Pittsburgh, Vandergrift, Youngstown, Canton, Wilmington

SUBSIDIARIES: Adamson United Company, Akron, Ohio
Stedman Foundry and Machine Co., Inc., Aurora, Indiana.

Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

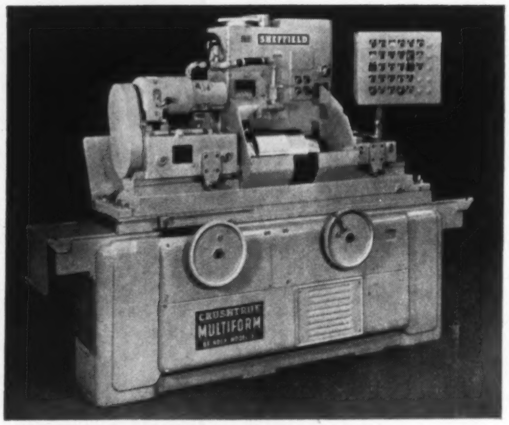
UNITED
ENGINEERING AND FOUNDRY COMPANY
PITTSBURGH 22, PENNSYLVANIA

6 minutes to grind this from this



with Sheffield Crushtrue® Grinding

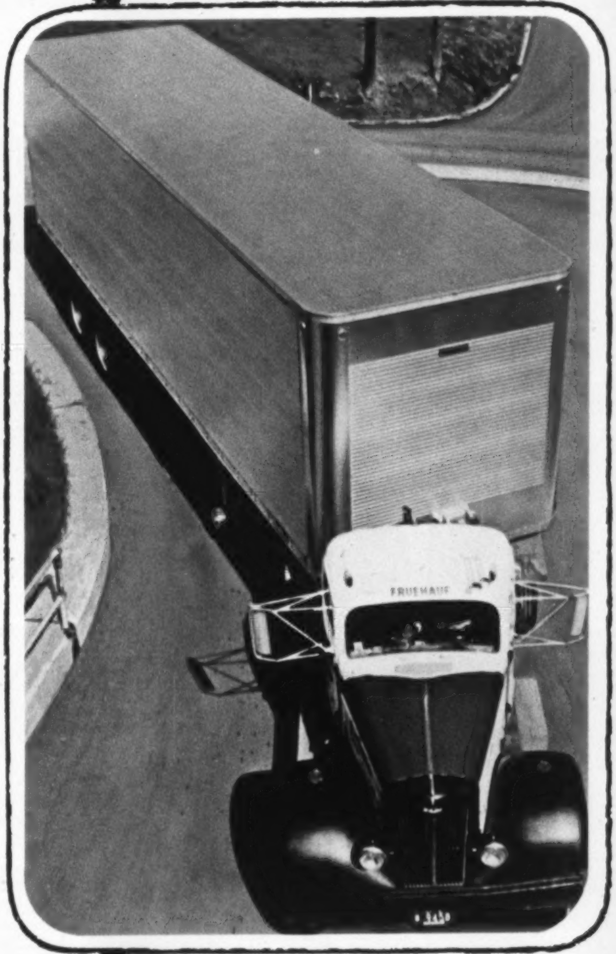
Crushtrue grinding of the 6-inch test specimen shown removes 8 cubic inches of metal to ±.001″ on diameter and is 8 to 10 times faster than previous machining methods. The high surface accuracy and finish eliminates the finish grinding and polishing usually required with lathe-turned specimens. Bars this same size are ground with the *same speed and accuracy* from this wide range of metals: 300 Series Austenitic stainless steel—High tensile steel alloy, 120,000 PSI—Armco Ingot Iron—Cold roll steel, SAE 1010 to 1020 range—Experimental tool steel, 1% carbon. This test specimen demonstrates the spectacular time savings, accuracy, and high surface finish attained on a wide variety of production parts by Sheffield Crushtrue Grinders. Write for these Crushtrue Process Bulletins: 180-55, FG181-260.



The
SHEFFIELD
Corporation *Dayton 1, Ohio*

A subsidiary of The Bendix Corporation

Inspection Gages, Dimensional Control Instruments, Machine Controls, Automatic Gaging & Assembly Systems, Measuray® X-Ray Thickness Measuring, Crushtrue® & Multiform® Grinders, Cavitron® Ultrasonic Machine Tools, Press-Pacer® Transfer Units, Large Dies, Tooling, Contract Manufacturing.



Dollar savings provided by building Volume☆ Vans with USS Cor-Ten High-Strength Steel

Fruehauf Trailer Company works some design magic with USS Cor-Ten Brand of High Strength Steel that results in substantial construction savings.

In their stressed-skin trailers, called "Hi-Tensile Volume★ Vans," USS Cor-Ten High-Strength Low-Alloy Steel is used for the side and roof panels, angles and rub rails. Welding this steel instead of riveting contributes to lower cost; also welded construction makes Hi-Ten Volume★ Vans strong and sturdy.

Increased strength and rigidity also are obtained by cold-forming Cor-Ten Steel side and roof panels with ¼"-deep rectangular corrugations. Angles and rub rails are of USS Cor-Ten High Strength Steel, and together with the side and roof panels, add up to a total of only 2,500 pounds in each trailer. Cor-Ten Steel also has improved atmospheric corrosion resistance and, as an added bonus, paint lasts much longer on USS Cor-Ten High-Strength Low-Alloy Steel.

In transportation equipment USS Cor-Ten Steel is noted for its long service life, low first cost and economical operation. Get the real facts on USS Cor-Ten Steel from United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS and Cor-Ten are registered trademarks.

United States Steel Corporation · Columbia-Geneva Steel Division · National Tube Division · Tennessee Coal and Iron Division · United States Steel Supply Division · United States Steel Export Company

This mark tells you a product is made of modern, dependable Steel.

United States Steel

Down go back-up roll costs with

Quality Forged Sleeves

Pictured above is James S. Rennick, a metallurgist with twenty years' experience in the Forgings Division of U. S. Steel. Jim specifies composition, heat treatment, and other processing procedures essential to the production of assemblies as shown in the main picture—a back-up roll that will be used in the cold reduction tin mill at U. S. Steel's Gary, Indiana, plant.

This job points up a curious situation: U. S. Steel is one of the country's leading manufacturers of rolls, and also one of the biggest *users* of rolls . . . a double reason to perfect their performance and reduce their cost . . . just as we did here.

We had to replace a worn, cast steel back-up roll. Rather than replace the entire roll, we machined the face of the roll and shrunk on a *forged* steel sleeve. For back-up rolls like this one, 42" O.D. and larger, this method of sleeving is much less expensive than buying a complete new roll. One arbor can be used for several forged sleeves. A forged sleeve has a hard, wear-resistant surface and is highly resistant to spalling.

Also, the sleeve is purposely produced with a softer bore to develop a desirable stress pattern, and to provide maximum gripping between the arbor and sleeve after assembly.

There is a good possibility that we can help reduce *your* roll costs. Write or call the United States Steel Office nearest you, or United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

United States Steel Corporation · Columbia-Geneva Steel Division · Tennessee Coal and Iron Division · United States Steel Export Company

United States Steel

TRADEMARK

This mark tells you a product is made of modern, dependable Steel.

USS "T-1" Steel cuts spiral case weight 45% at Oahe Dam

Oahe Dam will be the world's largest rolled earth dam . . . 9,300 feet long and 242 feet high. It will create a lake 250 miles long on the Missouri River above Pierre, South Dakota. Seven hydro-generators will have a total installed power capacity of 595,000 KVA.

USS "T-1" Steel cuts weight of spiral cases. Water for power generation will flow through seven spiral cases with inlet diameters of 20½ feet. USS "T-1" Constructional Alloy Steel not only met all requirements, but permitted a reduction of about 45% in the weight of the steel used. The total amount of USS "T-1" Steel used was 1,002 tons.

Cost Savings. By using USS "T-1" Steel, with a minimum yield strength of 100,000 psi, plate thicknesses ranged from ½" to 1¼". With carbon steel, they would have been almost twice as thick. Result: large savings in freight costs, erection time, and field welding costs. In future projects, costs might be reduced even more by the use of our new, more economical USS "T-1" type A Steel which has the same strength.

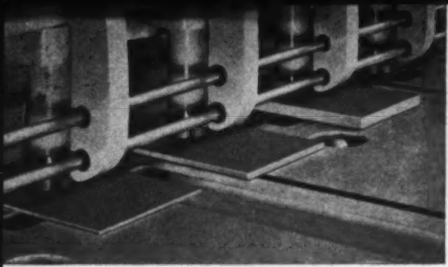
Giant steel tunnel liners, 24 feet in diameter and averaging 2,200 feet long, will carry water for power generation. 20,000 tons of structural carbon steel were used by U. S. Steel's Consolidated Western Steel Division to fabricate 449, 30-foot-long sections for the seven tunnel liners.

The Oahe Dam is being constructed under the supervision of the Corps of Engineers—U. S. Army, Office of District Engineer, Omaha, Nebraska. Powerhouse A-E: Sverdrup and Parcel. Powerhouse contractor: Atkinson-Ostrander Company. Spiral cases were fabricated by the Hydraulic Division of the Allis-Chalmers Manufacturing Company (the supplier of completed turbines), and field-welded and assembled by Chicago Bridge & Iron Company. Generators were supplied by General Electric Company.

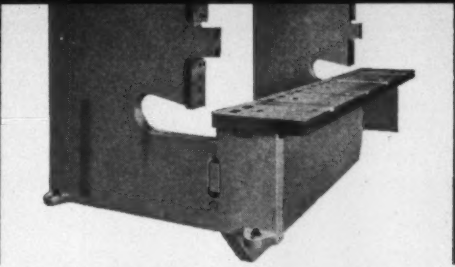
For more information write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS and "T-1" are registered trademarks.

United States Steel Corporation • Columbia-Geneva Steel Division • National Tube Division • Tennessee Coal and Iron Division • United States Steel Supply Division • United States Steel Export Company

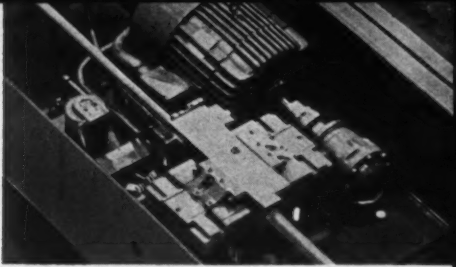
United States Steel USS



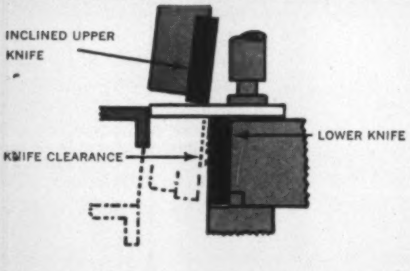
Hydraulic holddowns hold work securely.



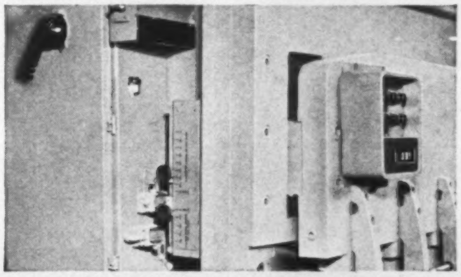
Interlocked construction eliminates load supporting welds.



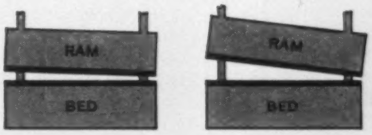
Compact manifold block replaces usual piping.



Inclined ram makes use of four edge knives practical.



Centralized controls improve operator's productivity.



Adjustable rake gives you extra shearing capacity.

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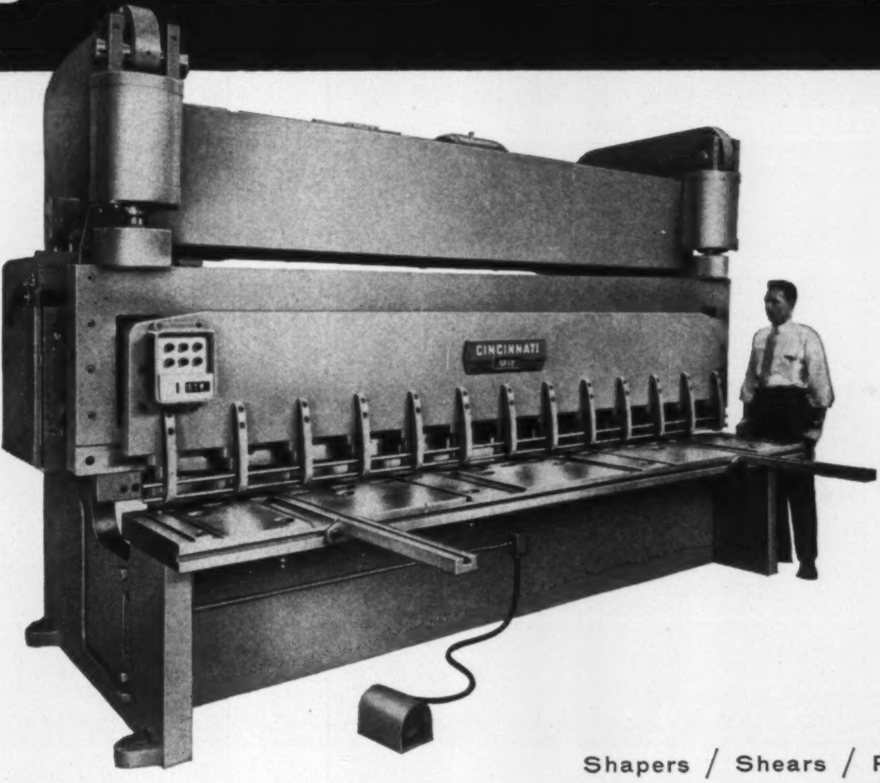
hydraulic shears



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METALGRAMS

UNION CARBIDE METALS

. . . news of "Electromet" ferroalloys and metals

NOVEMBER 1961

COLUMBIUM -- AN OLD ELEMENT WITH NEW USES -- Although columbium was discovered by Hatchett in 1801, it did not find any metallurgical uses until the 1930's. Then, Union Carbide Metals found that columbium prevented intergranular corrosion of 18-8 stainless steels, allowing welding. Other UCM findings: (1) Columbium improved the strength and toughness of plain-carbon and low-alloy high-strength steels; (2) Columbium reduced air hardening in plain-chromium stainless steels; and (3) Columbium increased the strength of high-alloy compositions at high temperatures. These applications find wide commercial use today.

* * *

COLUMBIUM STEELS CAPTURE HEADLINES -- Recently, a lot of interest has been shown in carbon steels containing a pinch of columbium. Up to 0.03 per cent improves strength and weldability with only a minor loss in ductility. At a price only slightly more than plain-carbon grades, the high-strength of these steels offers cost savings by permitting designers to use lighter sections. Today, columbium steels are being used in trucks and trailers, earth-moving and construction equipment, oxygen cylinders, and line pipe.

* * *

GROWTH PROBLEMS -- Columbium steels are having growing pains, though. Of some concern has been the transition temperature from ductile-to-brittle fracture. Although satisfactory low-temperature impact properties have been obtained in plate thicknesses up to 3-8 in., the transition temperature of heavier plate sections has increased. Research has shown that higher manganese contents, water quenching off the hot mill, or normalizing can improve heavier section impacts. For more information, write for the article, "Columbium in Carbon Steels," in the Fall 1961 issue of UNION CARBIDE METALS REVIEW.

* * *

FERROCOLUMBIUM AND COLUMBIUM METAL -- Union Carbide Metals has been producing high-quality ferrocolumbium and ferrotantalum-columbium for steel and high-temperature alloys since 1935. Now, UCM also offers electron-beam-melted ingots of columbium metal -- the purest columbium available. Columbium metal and columbium-base alloys have many potential uses. Their superior strength at high temperatures suggests many aircraft and space-vehicle applications. Their resistance to molten salts opens up chemical-equipment uses. Columbium's moderate neutron cross-section allows use in nuclear-reactor structures. Alloys of columbium are also being widely tested as superconductive materials. For more information, write for F-20,133 on ferrocolumbium, data sheet Cb-1 on columbium metal, and the article, "Mill Products Multiply," in the Fall 1961 issue of UNION CARBIDE METALS REVIEW.

* * *

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MARKET-PLANNING DIGEST

Metalworking Newsfront 6

HEAVY ELECTRICAL GENERATING EQUIPMENT, moving with its past five-year cycle, is expected to show a strong advance in new orders next year. One top equipment maker points to some sales gains this year but says the new order outlook for 1962 will register further gains.

A DECLINE IN SPECIAL TOOLING requirements by U.S. industry during the next five years is predicted by the National Tool, Die & Precision Machining Assn. Reasons for this decline: Imports of foreign products with hidden tooling, parts standardization in automotive and appliance fields, and more tape-controlled machines.

MAJOR APPLIANCES SHOWED BROADEST SALES GAINS of the year in September. National Electrical Manufacturers Assn. data shows sales gains over September, 1960, for all 7 equipment lines made by member companies. Gains averaged about 4 pct.

"GROWTH WITHOUT BOOM" FOR MACHINERY INDUSTRY is forecast for 1962 by H. G. Bixby, president of Ex-Cell-O Corp. He names five influences behind his forecast: Defense needs, general recovery, high auto sales with many design changes, more aggressive marketing by the industry, and the element that will keep the boom away, foreign competition.

CANS RATE HIGH OVER BOTTLES in dealer preferences. This is the finding of a research study just completed by Retailing Research for Jones & Laughlin Steel Corp. Almost 40 pct of retailers queried showed "awareness" of the expense of handling and storing no-deposit bottles.

THE PROFIT SQUEEZE in steel is taking over as the industry's prime concern. J. F. Smith, Jr., president of Inland Steel, calls it a common problem to overcome widespread lack of knowledge and understanding of the vital importance of profits. The squeeze factors: Higher raw material costs, climbing labor costs, foreign competition and competition from other materials.

INDUSTRIAL MATERIAL HANDLING EQUIPMENT showed new signs of sales strength in September. The new order index of the Materials Handling Institute hit 120.8 for the month. This is a 7.5 point rise over August; 9.5 points over September 1960.

It's what's below the line that counts

an investment in Bohler Tool and Specialty Steels will add another cipher to that all-important figure. ■ Well known in the industry for its highest quality, Bohler steels are supplied at a price that is considerably lower than the best domestic steels, the fact is, you can't buy better steel at any price. ■ There is a Bohler Tool and Specialty Steel for every purpose ready for shipment at the U. N. ALLOY STEEL CORPORATION or its subsidiaries. You can profit by checking into the benefits of Bohler steel with your nearest U. N. Alloy Representative.

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SPECIAL REPORT

Pentagon's New Buying Policy Causes Industry Shifts

Administration forms two new agencies in effort to end procurement red tape.

Some big companies already have changed their programs to fit military needs.

By R. W. Crosby

▪ Changes in military buying have caused a revolution in industry management policies. Main reasons for the shake-up are the Pentagon's emphasis on new weapons and new Defense Dept. buying methods.

In recent years, old-line weapons suppliers failed to keep pace with changing weapons requirements and new buying programs. New companies became lost in the Pentagon procurement maze. As a result, they failed to get government contracts. But then came the revolution:

The Pentagon, needled by Congress, began looking at its procurement and supply programs. It found a mess. But now the Pentagon is cleaning up the mess. President Kennedy, Defense Secretary McNamara, and McNamara's Deputy Secretary, Roswell L. Gilpatric, have helped. Industry fits into the new buying policy like fingers in a glove. But industry planning must be keyed more and more toward military demands.

Big Change—As shown in the chart, defense buying is changing significantly. Aircraft expenditures are 29 pct lower than four or five years ago. Defense spending on missiles, ships, ordnance vehicles, and electronic gear has doubled in the last five years. One defense spokesman says:

"Such changes present new problems to the managers of defense logistics and defense contractors." He says they require "a new appraisal of our (buying) practices."

Gilpatric's View—Deputy Defense Secretary Gilpatric puts it this way:

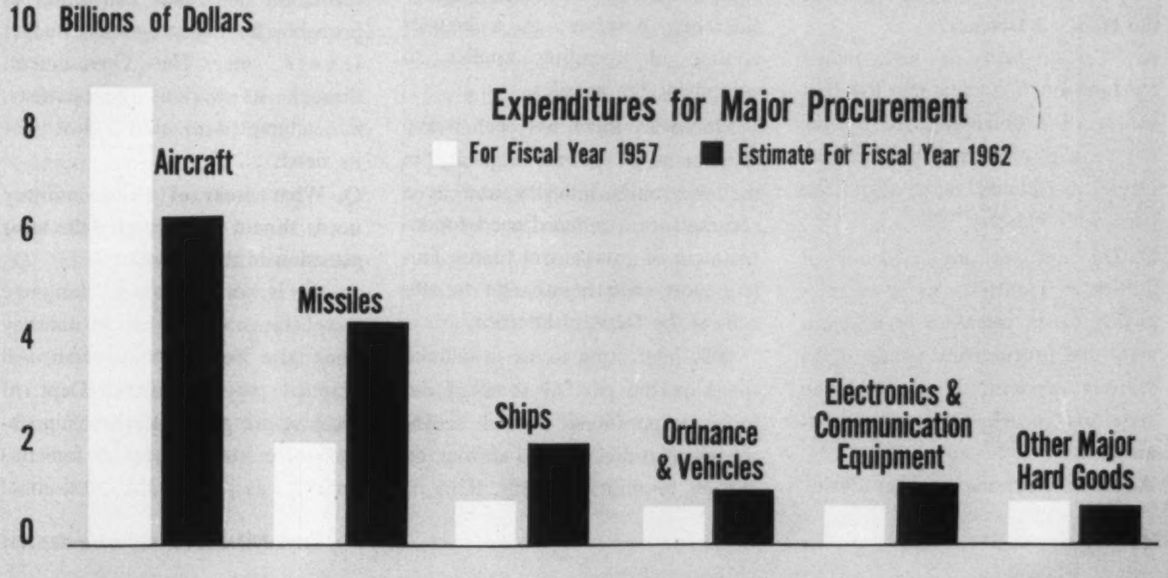
"Military equipment has changed drastically in the last ten years. Defense contractors must assume a greater share of the responsibility for the proper performance of the weapons and equipment they produce."

After answering Iron Age questions on some problems of changing Defense Dept. needs (see box), Mr. Gilpatric cautioned:

"Defense contractors should observe two caveats. One is the use of intermediaries with supposed special connections with the Defense Dept. The other is resort to political influence. Neither, in the end, pays off."

Mr. Gilpatric also pointed to the trend on the part of some large

Shifts Coming in Defense Spending



corporations "toward setting up specific divisions to devote attention to military needs."

More Emphasis—Among companies adding emphasis to military needs and procurement are Kaiser Metal Products, Ford Motor Co., The Martin-Marietta Corp., The General Electric Co., General Motors Corp., and the DuPont Corp.

Kaiser Metal Products is phasing out its domestic products line at Bristol, Pa., in favor of more profitable defense work. Ford is also shifting its attention to more defense and space business.

General Motors, DuPont and many other firms are sending special representatives to Washington to learn what changes they should make to get new government business. Company government-sales departments all over Washington are beefing up their staffs.

Looks to Future—Martin-Marietta, one of the nation's top missile makers, is looking 5 to 20 years in the future to keep sales and profits growing through defense business. It already has plans to move into the field of manned-space flight.

In GE's Heavy Military Electronics Dept., a new business development planning group has been established. The company says it was started "to keep pace with the growing complexity of a nation's requirement for highly effective and reliable defense systems."

Three Functions—GE's planning group will have three functions: Technological planning, market research, and advance business planning. Other GE departments have embarked on similar programs.

These companies realize they must work hand in hand with the Pentagon. The Defense Dept. is one of their biggest customers. The defense budget is over $50 billion, half the total federal budget, and probably will remain high for years to come. Much of the budget goes for procurement, research and development and military construction. It's a big market for industry.

Because buying patterns are changing at the Pentagon, industry must change its supply patterns.

Here is how Deputy Secretary Gilpatric sees the problem:

"With the international situation so critical and defense needs so urgent, we need prompt delivery of weapons and equipment which measure up to specifications. We cannot afford production delays. We cannot tolerate unsatisfactory material.

Many Failures — "There have been far too many failures in weapon systems, in critical items of equipment, and in installations. We are by no means satisfied that the unique managerial talent with which this nation is endowed has yet made itself fully effective in defense production. What is needed now is that extra ounce of effort, that extra degree of care, on the part of both labor and management.

How to Meet Defense Change

In this Iron Age interview, Deputy Secretary of Defense Roswell L. Gilpatric answers some important questions.

Q. Mr. Gilpatric, is U. S. industry keeping up with changing needs of the Dept. of Defense?

A. "Yes. In many instances industry furnishes the ideas for the best means of a defense posture. This is an era of challenge in which the Dept. of Defense must also keep pace with industry."

Q. Do you see any evidence of particular industries or companies paying closer attention to development and procurement needs of the military services? If so, can you state any specific references or examples?

A. "The electronic market during the past several years has shown an almost steady and continuous growth. This trend is expected to continue its upward movement. A considerable share of electronics has been produced for aircraft equipment. This is changing considerably, however, as a heavier volume of spending applies to equipment for missiles.

Moreover, there has been heavy investment of private capacity in the electronics industry and as a consequence a reduced need for investment of government funds. This is a most encouraging sign to officials of the Dept. of Defense.

It is interesting to see a definite trend on the part of some of our large corporations toward setting up specific divisions to devote attention to military needs. This in itself encourages new ideas on new military items."

Q. What is the Dept. of Defense doing to assist industry in meeting the changing needs of the military?

A. "The Dept. of Defense gives out maximum information, within security limitations, to assist industry in planning. This includes information on trends and shifts in probable buying programs, budget levels, etc. The Government, through its various publications, has attempted to alert industry of its needs . . ."

Q. What areas of U. S. military needs should industry give the most attention in the future?

A. "It is not possible to designate a specific area to which industry must give the most attention. All planned programs of the Dept. of Defense are geared to the main objective of total defense for this country, as well as the freedom of

Not only to increase output and reduce costs but to improve quality and reliability of the product."

To meet these needs and aims, the Pentagon has evolved a whole new concept of procurement. President Kennedy called for the changes shortly after he took office. Defense Secretary McNamara received this order from the President:

"Develop the force structure necessary to our military requirements without regard to arbitrary budget ceilings. Then procure and operate that force at the lowest possible cost level."

Changes Listed—Since then, Mr. McNamara says, his department has been:

Simplifying its organizational structures and clarifying lines of responsibility.

Speeding up decision-making processes.

Simplifying and standardizing its procurement specifications.

Reducing heavy reliance on single-source procurement, particularly for follow-on contracts and procurement of spare parts.

Cutting down development time for new weapon systems.

New Agencies—Two new procurement agencies have been established by the Pentagon. They are the Defense Supply Agency and the Logistics Management Institute.

The Defense Supply Agency centralizes buying of common items used by all the military services. It has started with the purchase of certain equipment and supplies. Eventually, it is expected to become a supply agency for all military buying. Industry would then do all its dealings at one Pentagon market place.

The Logistics Management Institute is a full-time organization of business management specialists.

They determine for the Pentagon what, how much, and how to buy most economically and efficiently.

The Institute will also develop new systems to determine what is needed to support changes in military buying plans. Undoubtedly the Institute will influence industry defense supply policies.

Economy Move—Much of the Pentagon's procurement change program is an economy move. The Pentagon is not asking businessmen to cut profits. But it is asking that businessmen cut costs.

One major new step toward this goal is the new bonus or penalty contract. Since much major hard goods buying is on a cost-reimbursement basis, the Pentagon believes incentives to assure close control over costs is greatly reduced. Under the new contract system, businessmen will be given the chance to get a cash bonus for good performance or be penalized for poor performance. Incentives could reach 15 pct of contract cost.

While developing these new programs, the Pentagon expects industry to move with the tide.

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all other friendly nations.

As a result, the Dept. of Defense is very receptive and will continue to press industry for product improvement in all military programs, from the smallest and least complex component to the largest and most complicated items of the weapons system, with the aim of obtaining at least cost reliability, ease of maintenance, simplicity of design and operation.

If factors deserve emphasis, they would be reduced costs and increased competition. These are items constantly stressed by Dept. of Defense officials."

Q. What recommendations or suggestions would you make to companies which want to expand their participation in defense contracting or to maintain their present position, if it is high? How can industry change its management procedures to best meet the changes in Defense Department procurement policies and changes in military programs?

A. "The same fundamental elements of management that contribute to a company's success in commercial endeavors are equally applicable to Defense business. We want to do business with contractors who can supply us with reliable products in a timely manner at a fair and reasonable price. This requires management procedures which can provide current and accurate cost and schedule status information and which will isolate and identify problem areas requiring special attention by decision makers. It places a premium on imagination, resourcefulness, flexibility and integrity of management personnel at all levels to meet the impact of changing requirements in a manner which serves the best interests of both their company and our Nation. On the whole, these qualities and the willingness to assume risks have characterized American industry for many years and the need for any revolutionary changes does not appear imminent."

GILPATRIC: Aim is defense.

How Ford Runs Its Steel Mill

It's Not Commercial, But Some Does Go Outside Ford

Operations of Ford's steel mill have always been a subject for speculation throughout industry.

The company says it is not in competition with other steel mills. But some steel goes to suppliers.

By A. E. Fleming

▪ Every so often there is word that Ford Motor Co.'s steel division is going to turn commercial, that it may start contesting for business like an independent mill.

Call it speculation or rumor. But such talk is arising again. Most Detroiters close to the steel industry discount the rumblings. So do Ford officials.

"There's nothing to it," claims N. E. Rothenthaler, general operations manager of the auto company's steel unit, one of only two "captive" steel plants in the country; the other is International Harvester Co.'s Wisconsin Steel Co., which does compete on the open market.

A Firm "No"—"We're in business strictly to furnish some of our own automotive needs," emphasizes Mr. Rothenthaler. "We've no thought of moving into competition with other mills and you can put that in capital letters. There's no reason to speculate about it."

He says Ford's steel policy always has been to stay off the open market and that the policy is as rigid today as it has ever been.

To Some Suppliers—However, Ford sells steel to certain suppliers that make parts for Ford Motor Co. vehicles. And division officials admit that "a bit of secondary steel goes to warehouses and small job shops," amounting to no more than the normal rejected material any mill might have.

Some of this material winds up in the hands of small stamping shops in Detroit, which turn out all types of parts besides automotive.

Why would Ford do this? The reason may be a matter of economics. To operate the Dearborn mill efficiently, Ford must run it as continually as possible. But the company can't always use all the steel it makes on a full mill schedule, so it sells the overflow to various outlets on a monthly basis.

Half of Its Needs—Ford turns out about half of its own steel needs on some products. Its biggest item is sheet, accounting for perhaps 90 pct of output. Although a small amount of bars is produced for leaf spring fabrication, output of such material as alloy bars, wire and coated steel is avoided.

Mr. Rothenthaler says that sheets wider than 60 in., such as those used for forming large auto panels, are also bought from other steel companies. Because of the cost of freight, Ford facilities such as stamping plants buy steel from independent mills closest to them.

To Galvanized?—Ford is a big user of zinc-coated steel, used in parts such as rocker panels for corrosion protection. Because of this, speculation has been that the company may build a continuous galvanizing line in Dearborn.

"We don't plan to install a continuous galvanizing line at the moment," says Mr. Rothenthaler. "There's not enough room."

Company insiders say Ford has studied and is continuing to study a galvanizing line. But a decision has not yet been reached by top management.

Modernization—In the meantime, Ford is spending $35 million on what it calls "a quality improvement and modernization program" at its steel works.

As part of the program a new oxygen plant will start operating in December. Built by Dravo Corp., it will provide enough oxygen to service lances in the company's 10 openhearth furnaces.

FORD MILL: Rated at 1.9 million tons capacity, Ford's steel mill on the Rouge River in Dearborn supplies about 50 pct of the company's needs.

MORE MOLYBDENUM: A. L. Greslin and J. B. Carmine examine ore samples from MCA's Questa, N. M., mine.

Moly Pushes to Meet Demand

Molybdenum producers, miners are making a three-pronged drive to boost supplies.

They are spending millions to meet soaring demand.

- To cope with a sharp surge in demand, molybdenum producers are opening new mines and stepping up exploration. In addition, three Canadian companies have announced plans to open new mines there.

Wallace Macgregor, president of Climax Molybdenum Co., a division of American Metal Climax, Inc., says that his company is putting $40 million into increasing output from its properties. He adds that he has exploration teams in the field now looking for new sources. Climax also has further expansion plans on the drawing board.

Big New Source — Max Hirsch, president of Molybdenum Corp. of America, reports that his company is bringing in a big new mine at Questa, N. Mex.

W. McGinnis, who specializes in molybdenum at the U. S. Bureau of Mines, has this to add: "Over the long term, the large known commercial reserves and the expanded production plans should assure the free world of an adequate supply."

If the expected defense buildup temporarily taxes supplies, help from the government stockpile is possible. Climax is talking with the government about buying surplus molybdenum in defense stockpiles.

Stocks on Hand—What about stocks on hand? Producers' stocks of concentrates were 4,144,000 lb (contained Mo) at the end of September. This was a slight increase over the 3,481,000 lb they held at the end of 1960.

Stocks of molybdenum in product form were 8,157,000 lb (contained Mo) at the end of last year. By the end of September they had dipped to 5,138,000 lb. Bureau of Mines people feel the latter to be "comfortable" at the current rate of consumption.

Exports Big Factor — To keep domestic supply in balance with demand, there's the possibility of a cut in exports for the last quarter of this year. Export has been the biggest single factor in the molybdenum boom.

One of the major headaches of the molybdenum marketers has been the uneven flow from copper mines, where molybdenum is normally a byproduct. Strikes at Kennecott and Anaconda mines in Chile, for instance, cut estimated 1961 output to 3.2 million lb—against 4.4 million lb in 1960. (These are pounds of contained molybdenum in concentrates.)

But Mr. Macgregor points out the most fruitful moly producers in the copper industry have the lowest costs and therefore are less affected by economic shifts. He is confident in his own appraisal of what to expect.

To take care of dislocations caused by a drop in by-product moly output, Mr. Macgregor figures there are two basic approaches:

One is to maintain large stocks of unsold moly at smelters—a difficult feat to accomplish right now. The other is through "surge capacity" which can be put into production when by-product output is down or out; the major problem here is the time lag.

Auto Stainless Faces Icy Test

Winter Challenges Corrosion-Resistant Qualities

Prodded by automakers, steel mills are working hard to develop stainless trim more resistant to corrosion.

As an answer, the mills have come up with five new alloys and several new processes, including bright annealing.

By G. J. McManus

▪ Winter snows and salted roads will soon show just how much headway stainless producers have made in their push to upgrade automotive trim.

Over the past 12 months or so, stainless mills have come up with five new alloys and at least two new processing steps. Accelerated tests indicate these bring a sharp improvement in corrosion resistance.

However, practical service experience of the new materials has been limited mostly to the warm weather months. And it is winters which have been giving auto plants trouble in their fight against corrosion.

Two-Year Battle—For stainless, this fight began in earnest about two years ago. At that time, there were reports trim was corroding in dealer lots and even before cars reached dealers. Increased use of salt and other corrosive agents on snow covered streets was a major part of the problem.

Also, demand for a brighter finish had led the mills to cut back on the amount of pickling given stainless strip. And the added brightness enabled trim makers to cut back on subsequent buffing. At both stages, there was a reduction in the surface conditioning given trim.

Fast Answer Wanted—In any case, corrosion problems developed. Auto plants started applying "monstrous" tests to incoming stainless. In top-level exchanges, they notified steel mills that some fast answers were expected.

The first answer came last year, with the installation of bright annealing lines at Allegheny Ludlum Steel Corp. and its subsidiary, Wallingford Steel Co.

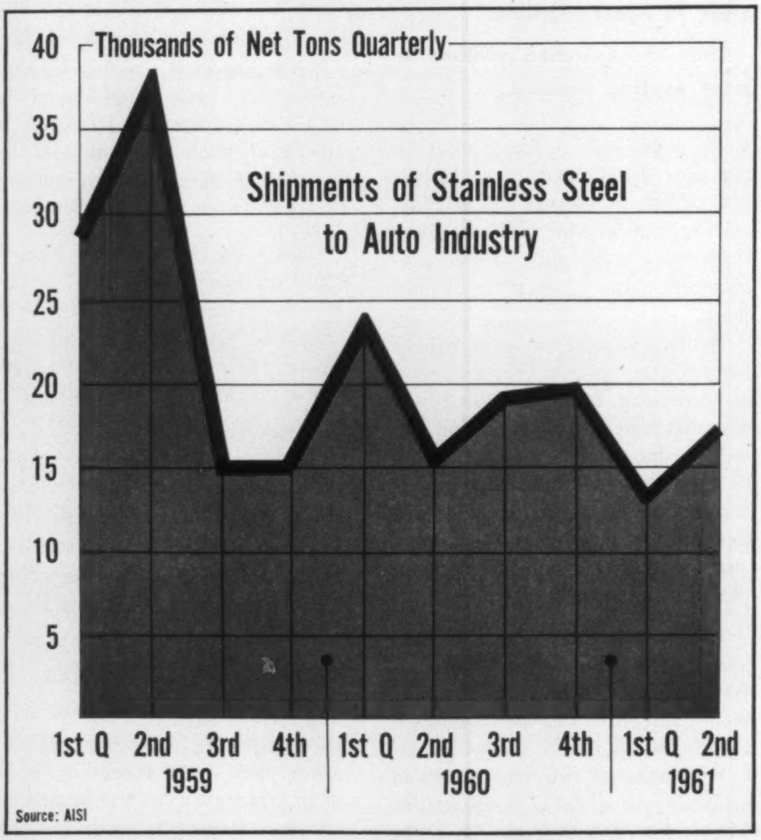
In bright annealing, an inert gas protects the strip surface during heat treatment. This prevents scale formation that is blamed for corrosion. It eliminates or reduces the need for pickling, which dulls the surface.

Results with bright annealing were favorable enough to bring general adoption of this process by stainless strip producers. Universal-Cyclops Steel Corp. is applying a buffing treatment instead. Most other major mills have gone to special annealing.

Bright Annealed Tested — Volume production of bright annealed strip did not start soon enough for extensive service last winter. Tests indicated the process was the basic answer to rapid surface etching. However, it was felt there was still room for improvement, particularly on the less typical stainless problems of contact corrosion and red rust.

In January of this year, Allegheny Ludlum came out with a new stain-

Will Auto Market Grow?



Source: AISI

less grade, having additions of 1 pct copper and 1 pct molybdenum. Designated 433, this grade offered added corrosion resistance, and was enthusiastically received by the auto industry. By spring, it appeared 433 would become the standard for many trim applications.

New Types Introduced—But certain objections were raised. Type 433 was not as easy to form as the old 430. Use of copper presented a contamination problem in scrap. For other producers, 433 had the further disadvantage of being patented by Allegheny Ludlum.

As an answer to these difficulties, type 434 (or 430 Mo) was advanced. This employs only the molybdenum addition and is actually an old composition. By August, 434 was pushing 433 out of the picture.

Another entry in the auto derby is 435, the minimum roping grade which contains columbium and is patented by Universal-Cyclops. Both columbium and molybdenum are added in a grade unofficially tagged as 436 (or 435 Mo).

In addition to all these, types 201 and 202 are being used for extra critical spots. Crucible Steel Co. of America says passivation is so vital a supplement to bright annealing that it has a special treatment for this second step. Various processing methods are being tried to get away from columbium, an expensive and tricky alloying element.

Moly Addition Studied—General feeling right now is that some type of molybdenum addition will be used. The alloy with copper is out of favor but Allegheny Ludlum feels service performance could change thinking in this regard. Forming difficulties and scrap segregation problems have been exaggerated, says Allegheny, and 433 could still prove the best answer.

The variety of grades and processes being tried is a measure both of the pressure for change and of the difficulty of knowing which way to change. The auto companies have left no doubts as to the importance they attach to corrosion problems.

Job Retraining: There Are Limits

■ "Retraining doesn't make jobs. Jobs must first exist."

This statement, made by a top corporate personnel expert, highlights the tough and frustrating problems in retraining and relocating displaced workers. E. S. Willis, General Electric Co. manager of employee benefits service, made this point last week at a Detroit session of the National Industrial Conference Board. The theme of the meeting was handling problems of retraining and relocation.

Even as the personnel men met, Labor Secretary Arthur Goldberg was terming newly-released jobless figures as "disturbing." In October, for the eleventh straight month, jobless rolls covered almost 7 pct of the U. S. workforce.

Broad Hint—Industry is racing against a secondary problem in its efforts to retrain workers. Mr. Willis urged action along these lines by "all industry" so that the "rigid hand of government will not take over."

Drawing on company retraining efforts that go back to the 1930's, Mr. Willis said; "Even in a company as widespread and diversified as GE it is impossible to establish any central retaining arrangements other than broad general guides."

He emphasized that "working arrangements must be local." Going further, and hinting at government actions or corporate-wide efforts, Mr. Willis said: "Any attempt to impose retraining on a national basis would be so complex as to be impractical, wasteful and discouraging to more people than it would help because the training would fit no existing need."

Government Role—The GE executive drew a clear picture of the most effective role the government can play in retraining.

"There is only one function in which the government can be of help. This is to provide facilities for obtaining and disseminating accurate current data on skill needs of every locality, assembled through the latest computer techniques on a national basis and made available nationally."

Company plans that offer cash payments to displaced workers don't soften the blow or solve the basic problem, GE has found. One company plan offers an option of cash or paid-up tuition in a vocational course to learn a new skill. Worker preference leans to cash. This payment is often used "to pay off debts."

No Self-Help—Says Mr. Willis of his company's experience in this line: "We have found that with new enhanced security arrangements an employee is inclined to remain at a location on the chance that a job opening will occur rather than use some of the money for retraining or move elsewhere. Too much security seems to reduce the responsiveness and adaptability of the labor force."

Another speaker, E. L. Heckler, public relations manager of Armour Co., confirmed conclusions of GE. In one analysis of laid-off company workers he found that up to 65 pct expressed interest in moving to a new job in another Armour plant. However, only 4 pct did move.

Industry Problem—Workers will do little to help themselves in retraining. And companies cannot expect to "pass on the problem" to the government. Says Mr. Heckler, speaking out of long experience: "Public employment services have been of very little help in finding new jobs for displaced workers."

Tool Builders Look Overseas

Foreign industrial growth rates now far outstrip U.S. gains, experts point out.

But what is needed is advanced type tools, builders are told at national meeting.

■ The main road to bigger markets for U. S. machine tools leads overseas. But it is the more advanced types of tools that are in greatest demand.

These were points stressed by speakers last week at the 60th annual meeting of the National Machine Tool Builders Assn. More than 300 tool builders heard that foreign sales opportunities for U. S. machines are "real and present."

Foreign Growth—Outgoing NMTBA president, E. M. Hicks, Norton Co. vice president and general manager, set industry sights on the spectacular growth markets overseas. "During the decade from 1950 to 1960," he pointed out, "world production of steel increased by 77 pct. In common market countries the gain rate was 129 pct; in Japan, 358 pct. U. S. steel production rose only 3 pct."

Mr. Hicks also pointed to foreign gains in autos. In 1949, the U. S. produced 77 pct of the motor vehicles made in the world that year. In 1960, this percentage had dropped to 51 pct.

Concluded Mr. Hicks, "The important thing I am trying to stress is the extremely rapid rate of industrial growth taking place elsewhere, while the U. S. is remaining relatively stagnant." This industrial growth, added the outgoing MTBA head, points clearly to a big market for U. S. machine tool builders.

Other tool builders, fresh from trips to foreign markets, picked up where Mr. Hicks left off. They focused on specific challenges and opportunities to U. S. tool builders in cracking these markets.

German Market—"The German market is ripe for development by an energetic sales program," said W. E. Rutz, executive vice president, Giddings & Lewis Machine Tool Co. Mr. Rutz was a member of a trade mission made this year to W. Germany.

He stressed the time element in promoting machine tool sales in Germany—"before new and expanded market opportunities have been preempted by German and third country competitors."

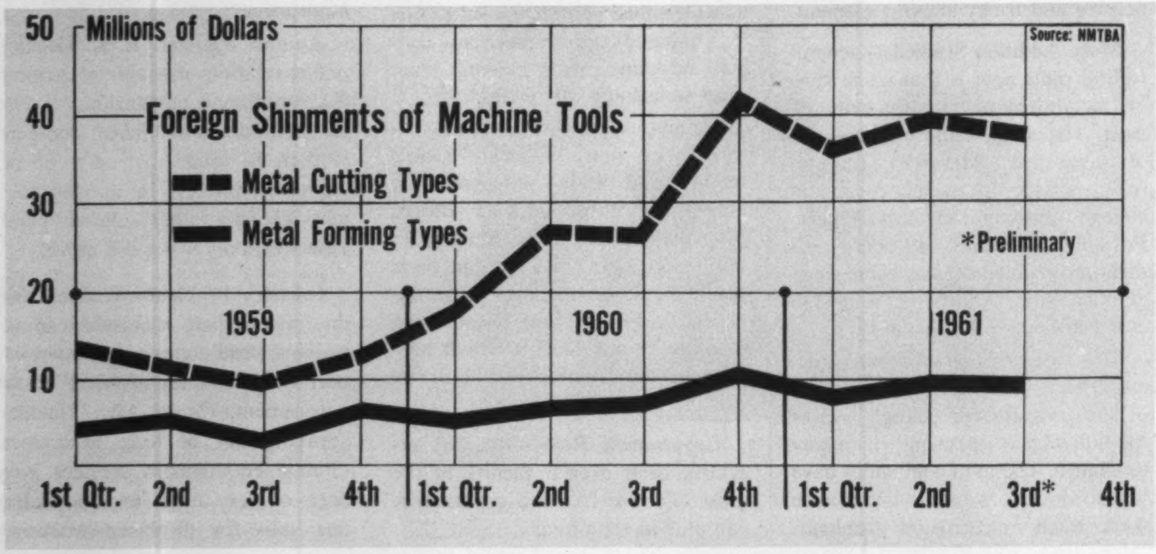
The big need in Germany, added Mr. Rutz, is for numerical-controlled machine tools. This is due to two factors. One factor is the shortage of skilled mechanics and rising costs. The other factor lies in the growth pattern of post-war German industry.

"During the last 15 years," said Mr. Rutz, "the metalworking industry in Germany has been built up with the newest plant and equipment. Practically all of this equipment is of conventional type and design, prior to introduction of numerical control."

Head Start—Mr. Rutz urged U. S. tool builders to realize that they have a "three to five-year head start on many tried and tested units and equipment." This advantage can be turned to powerful sales arguments, he claimed.

Mr. Rutz also pointed out that

U. S. Machine Tool Exports Show Rising Trend



"an extremely great number" of German manufacturer-dealer sales organizations interviewed want to include American machine tools in their lines.

He admits that U. S. prices are higher. But he added: "Deliveries in Germany are long, and when firms finally accept the higher-priced equipment, they justify it on delivery only."

Speakers at the tool builder meeting emphasized differences in segments in the foreign market.

Japanese Market—"To do business in Japan," said C. B. DeVlieg, board chairman of DeVlieg Machine Co., "one must first become acquainted with the people, their customs and their traditions."

Mr. DeVlieg has lately returned from his eighth trip to Japan since 1952. He has watched closely trends and changes in this growing market.

Japan, said Mr. DeVlieg, is a "convertor" nation and a foreign trader. The opportunity to sell machine tools is largely based on the fact that Japan depends on "her ability to convert raw materials into useful commodities to export for her livelihood."

He pointed out that the trade routes to Japan are well blazed for tool builders. "In 1960," he said, "the two-way trade between the U. S. and Japan totaled $2.5 billion, divided almost fifty-fifty. We are Japan's largest export market, and they are our second."

NMTBA Backs Tax Credits

NMTBA reverses its position on President Kennedy's program of a flat, 8 pct tax credit.

Feeling is that a full depreciation reform could take years.

By E. C. Beaudet

▪ The Kennedy Administration's tax credit program for stimulating plant modernization has gained the support of the machine tool industry.

While some large industry groups (including the NAM) still oppose the program, the National Machine Tool Builders' Association has come out in favor of a flat, 8 pct tax credit on all purchases of capital goods.

The Background — Several reasons are given for the Association's backing President Kennedy's program for providing new investment incentives:

1. There is some question whether simple liberalization of depreciation policies would be enough to stimulate massive doses of investment needed to keep the nation's industrial plant competitive in world markets.

Many companies still have not taken advantage of liberalized depreciation methods passed by Congress in 1954. And, to keep reported earnings looking good, they may not take advantage of any changes in the future.

2. A thorough reform of depreciation policies may be long in coming. Congressional action on depreciation might take until 1964 or 1965, some say.

3. The Treasury's intention to liberalize depreciation regulations by shortening the useful lives of industrial equipment for tax purposes.

Textile Move—Recently, Treasury revised Bulletin "F" schedules of useful lives to allow textile machinery users to write off equipment in 12 to 15 years rather than 25 years.

Machine tool builders, in requested recommendations to the Treasury Dept, have suggested a five to ten-year useful life for machine tools. This recommendation is now under consideration at the Treasury.

In making known the tool builders' position, Everett M. Hicks, outgoing President of the NMTBA, said at the association's annual meeting last week: "In my opinion, those segments of American industry which opposed the tax credit were mistaken because they failed to recognize the vital importance to the welfare of our country of the modernization objective which motivated the recommendation."

Mr. Hicks is Vice President and General Manager of the Machine Tool Div., Norton Co., Worcester.

Not Unanimous—Not all members of the Association are in agreement with the group's official position. Some say it is a surrender of principle and may delay a thorough overhauling of depreciation laws.

Other members, and Mr. Hicks himself, express concern that the credit idea might be used to promote economic and social reforms which would lead to the abuse of tax laws.

Mr. Hicks prefers that Congress give consideration to England's method of tax allowances for investment in capital goods. The net effect of the investment allowance would be the same as the tax credit but would not lead to abuses.

Changed Positions—When the tax credit plan was recommended in President Kennedy's tax message last April, the association did not go along with it at that time.

While in sympathy with its objectives, the NMTBA was fearful that it might serve as a substitute for depreciation reform.

Also, the President's original proposal called for a graduated tax credit which the industry believed unnecessarily complex and inequitable to many taxpayers. Since then, the Treasury has modified the plan and has favored a flat, across the board percentage tax credit.

Steel Production for World Sets Record

World Production of Steel Ingots, Nine Months 1960 and 1961, in Thousands of Net Tons

	Nine Months 1960		Nine Months 1961	
	Tons	Percent	Tons	Percent
United States	80,401	29.3	70,527	25.6
Canada	4,423	1.6	4,770	1.7
European Coal and Steel Community:				
Germany, West	28,184	10.3	28,309	10.3
France	14,019	5.1	14,593	5.3
Benelux	11,017	4.0	10.852	3.9
Italy	6,724	2.5	7,433	2.7
Total ECSC	59,944	21.9	61,187	22.2
United Kingdom	20,150	7.3	19,075	6.9
U.S.S.R. (Russia)	53,354	19.5	57,800	20.9
Japan	17,737	6.5	22,570	8.2
Other Countries	38,000	13.9	40,000	14.5
World Total	274,009	100.0	275,929	100.0

World steel production of 276 million tons set a new nine-month record this year. Increased output in Japan and the Soviet bloc largely offset a drop in the U. S.

Previous record for nine months, 274 million tons, was set in 1960. U. S. production dropped 12.5 pct this year to 70 million tons. This is 10 million tons below the post-strike buildup period of 1960.

The U. S. accounted for 26 pct of world output in 1961, compared with 29 pct in the nine-month period of 1960. This drop reflects the sharp growth abroad.

Japan's production jumped 27 pct in the first nine months of this year. It is now number 4 as a world steel producer, displacing Britain for the first time. Britain, with a 5 pct drop, and the U. S. were the only nations to show a production decline.

The European Coal and Steel Community recorded a 2 pct rise in the first nine months. Italy had the highest rate of increase among ECSC countries, 10.5 pct.

Soviet steel output continued its climb, rising 4.5 million tons, or 8 pct.

Tariff Concessions From GATT Awaited

The question is arising in Washington: When will the government announce tariff concessions between the U. S. and foreign countries being worked out at Geneva?

There have been reports that trade concessions from the General Agreement on Tariffs and Trade (GATT) negotiations will be out before Christmas. This would allow industries hurt by concessions to cool down before the Administration puts its new foreign trade program before Congress.

But U. S. Tariff Commission sources doubt the results of GATT negotiations will be made public this year.

"Buy-Italian" Gone

Italy has removed two "Buy-Italian" laws from the statute books.

The first provided low-interest loans to farmers to buy agricultural machinery, only if the equipment was of Italian manufacture. Farmers can now get the low-rate loans, but may buy their machinery without regard to origin.

The second measure exempted Italian new car buyers from paying the national road tax for six months, provided the vehicles were made in Italy. This proviso is also dropped.

Federal Trustbusters Team Up With States

A pact was made between federal and state trustbusters last week in Washington to combine forces against industry price-fixing and bid-rigging.

A meeting of Justice Dept. antitrust officials and legal representatives of 35 states concluded with an agreement to work closer in the antitrust field and exchange price-fixing information.

Attorney General Robert Kennedy told the state legal men, including 25 state attorney generals, his department was "putting a great deal of emphasis" on the price-fixing program. He said a close working relationship between federal and state officials was "essential."

Lukens Steel Reports 3rd Quarter Earnings

Third quarter net earnings for Lukens Steel Co. were $645,410, not $2.5 million as incorrectly stated in the Nov. 9 Iron Age. Earnings for the third quarter of 1960 should have read $48,861. Second quarter earnings this year were $1,377,275.

Lukens also report sales in third quarter '61 of $23,023,803, compared with $20,137,322 in the same period of '60.

Tougher Measures For "Union Busters"

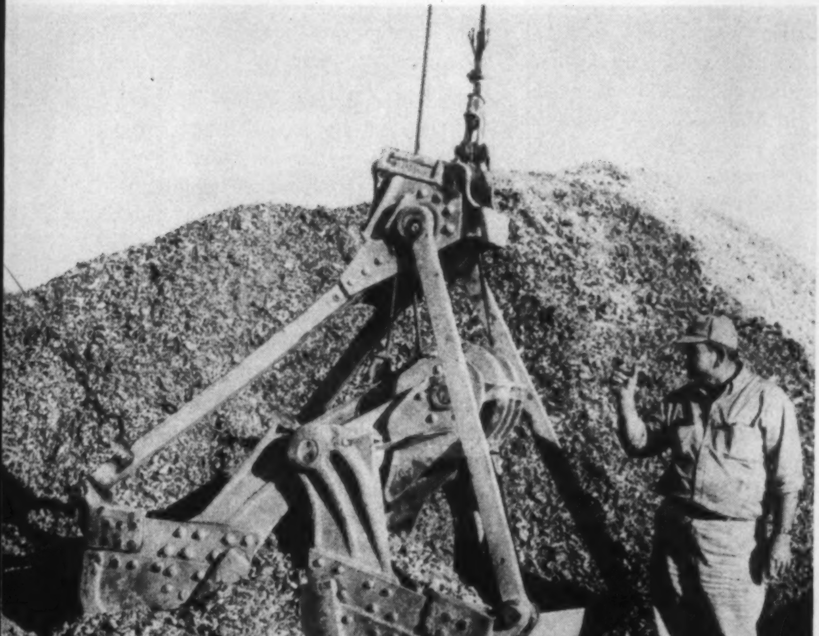
The National Labor Relations Board has stepped up its campaign against employers accused of union-busting.

The NLRB is pressing court action to prevent company officials from illegally discharging workers for pro-union activities.

Now **you can get USS "T-1" Steels from Steel Service Centers coast to coast.**

STEEL SERVICE CENTER INSTITUTE

USS "T-1" Steel outlasts other steels 3 to 1 handling oyster shells, sand and gravel



Bucket frequently bangs against bottom of barge. USS "T-1" Steel's greater toughness and resistance to impact abrasion and corrosion more than tripled bucket life.

"It takes a mighty tough steel to scoop cubic yard after cubic yard of oyster shell, sand and gravel day in and day out—and still not break down under rough handling and wear. In this service, USS "T-1" Steel outlasts other steels used three to one."

These are the words of a big Texan, L. M. (Buck) Clark, vice-president and assistant general manager of Southern Materials Corporation, Freeport, Texas. The firm provides wholesale quantities of oyster shell, sand and gravel dredged up from the Gulf bottom for fill, road construction and concrete work.

In the past, their 1½-yard clamshell bucket lasted for about six months handling sand and gravel and about twice as long scooping shell. One repair job cost $1,280 and results were no better. Then it was decided to substitute USS "T-1" Constructional Alloy Steel for the lips, end panels and side panels of the buckets. The repair job was done in the company shop and the cost was about $500. Mr. Clark says, "During the two years since I put 'T-1' Steel in, it's been holding up fine."

The USS "T-1" Steel used was furnished to 321 minimum Brinell hardness and does a much better stand-up-take-it than anything else that was tried.

Besides resistance to impact and abrasive wear, USS "T-1" Steel solved a severe case of corrosion from salt air in both the bucket and the hopper. Corrosion build-up had to be chipped away in the old equipment causing a lot of downtime. USS 'T-1' Steel reduced maintenance about 50%.

USS "T-1" Steel and the new, lower-priced USS "T-1" type A Steel can be furnished to a minimum yield strength of 100,000 psi, or a minimum hardness of 321 Brinell, depending on application. USS "T-1" Steel can also be furnished to 360 Brinell. Both of these tough, weldable steels can reduce weight and increase the strength and life of your equipment. Call your local Steel Service Center for more information. Or, for the name of the distributors of USS "T-1" Steels nearest you, write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pa. USS and "T-1" are registered trademarks.

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United States Steel Export Company

USS United States Steel

INDUSTRIAL BRIEFS

New Name — American Metal Stamping Assoc. is the new name of the national association of metal stampers and their suppliers. The group had been known as the Pressed Metal Institute.

Dust Catchers—Bethlehem Steel Co. has installed three open hearth dust precipitators at its Lackawanna plant. Four others are nearing completion.

Foundry Change — American Brake Shoe Co.'s Railroad Products Div. will spend $2.5 million to convert its Toledo cast iron freight car wheel foundry. When completed, the plant will be able to produce 45,000 "Southern" cast steel wheels annually.

Service Center—Uddeholm Co. of America has opened a specialty steel service center in Elk Grove Village, Ill. The center will serve the Chicago-Milwaukee industrial area.

NEW INKS FOR METALS RESIST 2500° HEAT

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Space Chamber—Pittsburgh-Des Moines Steel Co. has built a stainless steel space simulation chamber for General Electric Co. It is 32 ft in diam x 54 ft high.

Sperry Bought—Automation Industries, Inc., Torrance, Calif., has acquired Sperry Products Co., Danbury, Conn., makers of ultrasonic non-destructive testing instrumentation. Sperry will operate as a division at its present facilities.

Australian Subsidiary — Atlas Steels Ltd. of Canada has formed an Australian subsidiary with headquarters in Melbourne. Atlas Steels (Australia) Pty. Ltd. will produce drawn high speed steels and drawn stainless steel wire.

Material Handling — Bert E. Phillips has been elected president of The Material Handling Institute. He is vice-president and general manager of Clark Equipment Co.'s Industrial Truck Div.

Detroit Deal — Waukesha Cutting Tools Inc., Waukesha, Wisc., has acquired Gairing Tool Co. of Detroit. Gairing's products include spade drills, boring cutters, counterbores, spotfacers, milling cutters, counter sinks and boring bars.

New Distributor—Foundry Service and Supply Co., Baltimore, has been named an ingot distributor for Kaiser Aluminum & Chemical Sales, Inc. The company will distribute in the western Md., Va. and south central Pa. areas.

Rocket Division — United Aircraft Corp. is forming a new division to support its subsidiary, United Technology Corp., Coyote, Calif. The Solid Rocket Div. will aim for volume production of rocket motors using solid propellant.

Spur Delivery—Fansteel Metallurgical Corp., North Chicago, Ill., has doubled its warehouse capacity. The company says this will permit speedier deliveries and increased order size.

Michigan Move—Drillunit, Inc. has moved to larger quarters at 11451 Timken Ave., Warren, Mich. The firm makes drillunits and machine tool components for the machine tool industry.

Indian Licensee — Steel Plant Pvt., Ltd. of Bombay will manufacture and market in India metal-melting and heat-treating equipment developed by Hevi-duty Electric Co. of Watertown, Wis.

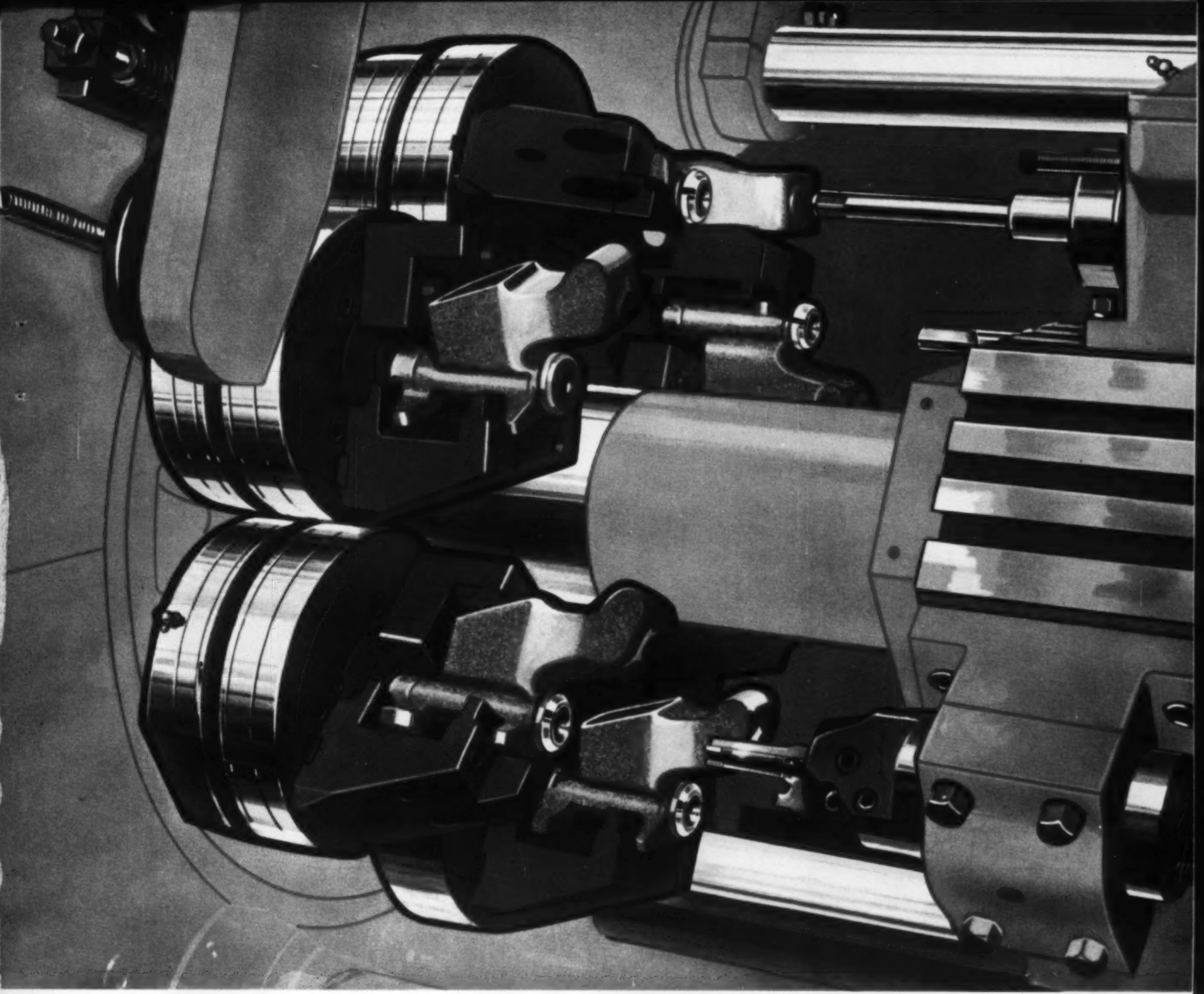
Plant Change—Assembly Engineers, Inc., Los Angeles, will relocate to a new 26,000 sq ft plant at 3650 Holdrege Ave. The company makes precision devices for the aerospace industry.

Facilities Triple—Gould-National Batteries, Inc., St. Paul, is expanding the production facilities of its Vandalia St. nickel cadmium battery plant. The addition will about triple the company's present production facilities.

New Division—Air Products and Chemicals, Inc. has formed a new division called the KGM Equipment Co. for the manufacture and sale of welding and cutting equipment and supplies. It will take over and consolidate the operations of the K-G Equipment Co., subsidiary of Air Products, and the Alexander Milburn Co., subsidiary of Southern Oxygen Co.

Canadian Buy — The Black-Clawson Co., New York, has purchased The William Kennedy & Sons Ltd., Ontario, Canada, from Hadfields Ltd., of England. The Canadian firm will manufacture a complete line of Black-Clawson equipment for Canadian pulp and paper mills.

Plant Purchased—United States Pipe and Foundry Co. of Birmingham has purchased the Soil Pipe Div. of Combustion Engineering, Inc., located in Chattanooga, Tenn.



Odd shapes no problem *on New Britain Chuckers*

The peculiar problems presented by odd shaped pieces are frequently as varied as the pieces themselves. The cut may be simple enough but the how and wherefore of chucking and swinging the piece may be something else again. New Britain Chuckers can handle the widest possible range of pieces—even odd shaped work. Open-end design which allows wide open accessibility to the tooling area makes the work easier to chuck, and easier to watch during the machining cycle. Because the work area is more open, this kind of work is easier to swing on a New Britain. This is one of many extras that are built into New Britain Chuckers. Another basic New Britain difference that pays off handsomely is the exclusive forming arm design which allows for the greatest possible variety of side cuts without special set-up. The combinations of end-working and forming cuts possible are practically unlimited. This flexibility of tooling coupled with big capacity lets New Britain users perform the widest possible variety of chucking machine work. Why not call in your New Britain representative?

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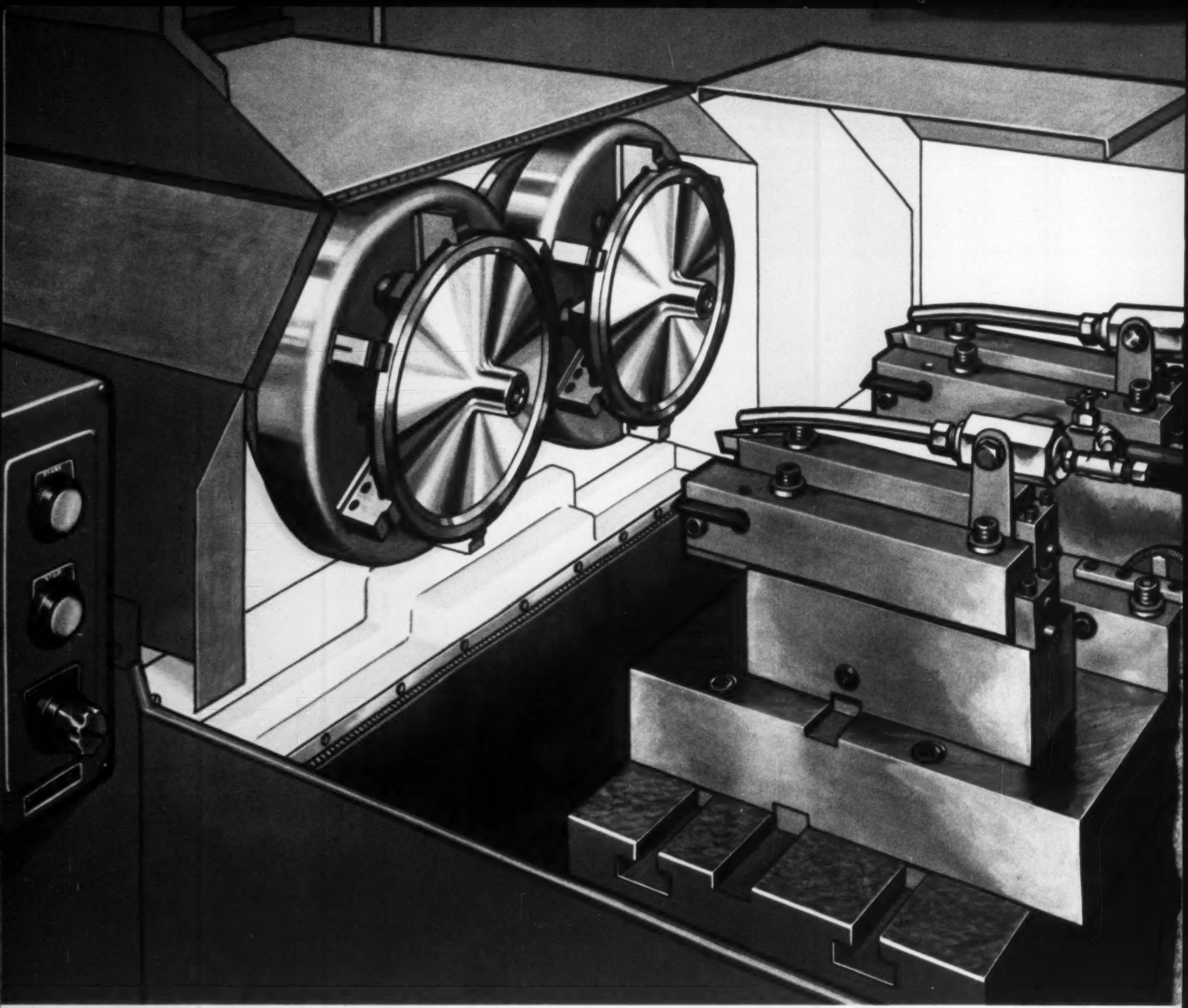
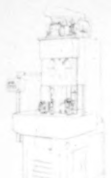
New Britain-Gridley Machine Division ◆ New Britain, Connecticut





New Britain cam actuated *boring and contour turning*

Extreme accuracy, high productivity—even on complex contoured surfaces—these are the areas where New Britain's Vertical and Horizontal Precision Contour Turning and Boring Machines take the kinks out of production. Tool slides are cam actuated, generating contoured and straight surfaces, including sharp corners and exact radii. Time consuming wheel forming and dressing required by some methods of producing close tolerance, fine finish work are eliminated.

This is basic with New Britain and is a good part of the reason for the unbeatable repetitive accuracy of these machines. Both verticals and horizontals are simple to operate and simple in operating principle. Normally, gaging one dimension is sufficient. From one to four high speed spindles can be mounted on a single machine.

The widely accepted horizontals, or the completely new and revolutionary verticals with exclusive cam-in-head design, can be seen in action simply by contacting your New Britain representative. Whether you require one machine, several machines, the best approach to a building-block set-up, or whatever your precision contour turning or boring requirement may be, check with New Britain before you decide.

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division ◆ New Britain, Connecticut

Employee Counseling Pays Off

Most companies believe in helping their employees solve personal problems.

The majority feel the effort is worthwhile. But there are some doubters.

▪ The front office usually wants to help employees solve their personal problems. But managers disagree on the best method and the success of the counseling.

Over 130 company executives were questioned on the subject in a new survey of the Personnel Policies Forum of the Bureau of National Affairs.

Seventy-five pct are actively engaged in employee counseling—helping employees solve personal problems whether on or off the job. Another 22 pct, while lacking "counseling services as such" have supervisors or personnel people help employees with their problems. Only 3 pct of those surveyed had no form of counseling.

Man-Maintenance—Virtually all the reporting companies believed counseling is worthwhile. A few larger companies disagreed.

A company which feels counseling is valuable answered in part, "We believe in man-maintenance. Machines are maintained by carefully following the instructions in the manual of operations.

"Why? Because they cost money and when they aren't running they cost more money. We don't kick them when they fail. We believe people are even more valuable than machines and when they have problems which reduce their efficiency, it's good business to help them eliminate their difficulty, which will help increase their productivity."

. . . Or Welfare Agency?—"We do not think that counseling is a panacea, but we do think it is one of the basic items in our practical approach to man-maintenance."

However, another company doesn't see it that way. "The cost of a counseling service, as such, would not improve the profit picture of the company. . . . It does not appear that running a full-scale welfare agency for the benefit of the exceptional employee could be profitable no matter how many intangible benefits may be claimed."

What benefits does a company get from counseling? Among those listed by those surveyed are improved morale, greater efficiency, reduced absenteeism, less turnover and fewer grievances.

Why They Worry—When counseling is provided, what problems do employees bring up? Not surprisingly, financial problems top the list among 51 pct of reporting companies. Items such as wage attachments, garnishments and indebtedness are mentioned.

On-the-job problems, including interpersonal relationships, adjustments, placement, and others, are cited by 30 pct. Next in line, in order of mention, come career-development, marital or family issues, medical problems and legal questions.

Is Industry Shelter-Minded?

▪ How prepared is industry to keep operating in case of war or other disasters?

Results of a survey by the National Industrial Conference Board show plans range from none at all to elaborate, well-organized programs.

An overwhelming majority of the 205 companies surveyed do not have facilities or plans to protect employees from nuclear war or catastrophe, the NICB says.

Awaiting Word—Only 5 pct have built fallout shelters and less than 5 pct are reported considering constructing such shelters. Some say they are awaiting more specific directions from the Federal government. Most, however, have routine safety and civil defense plans.

The most common action taken is providing for safe-guarding of vital company records in the event of a disaster. About 40 pct questioned have stored vital records in locations away from headquarters.

Management Lists—Many companies have made specific plans to assure continuity of management in an emergency. Some have arranged to set up emergency management committees. Several have prepared lists which define the chain of management succession during emergencies.

Alternate headquarters have been designated in outlying company locations by several companies. Some have built special installations to serve as emergency control centers.

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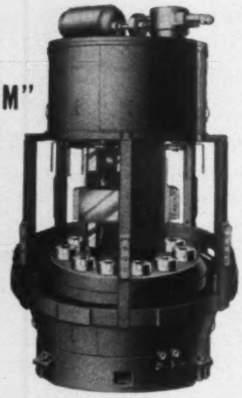

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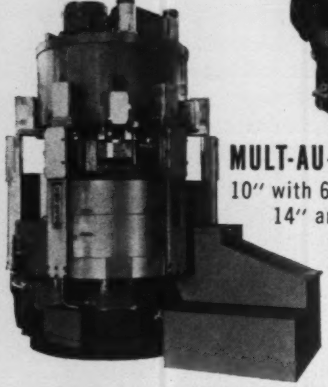

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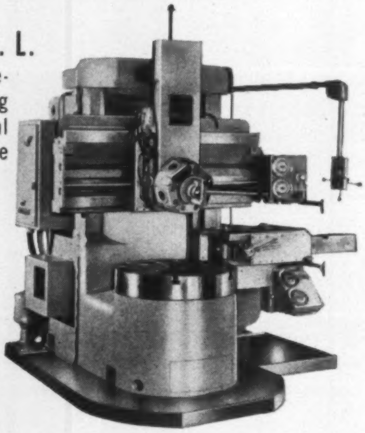
26" to 86" in 10" increments. Discrete positioning or contouring numerical control system can be applied.



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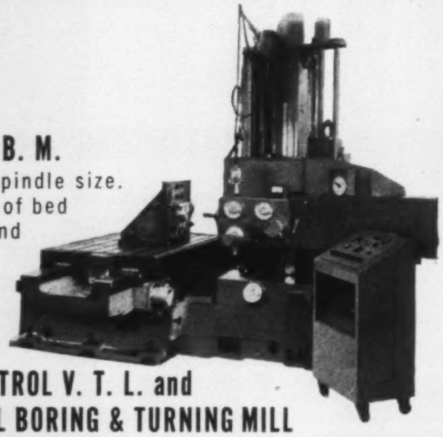

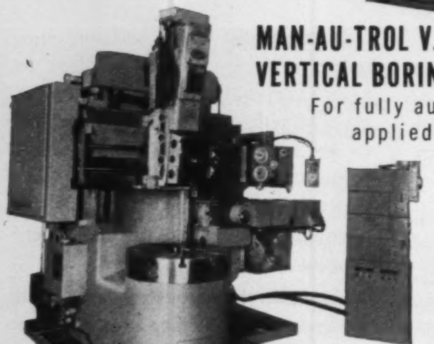

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For fully automatic operation, can be applied to any or all heads of Dynatrol at time of ordering or at later date.

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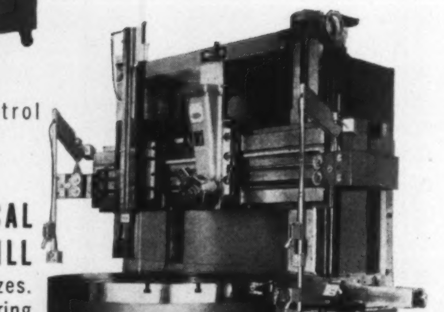
108", 124", and 144" table sizes. Discrete positioning or contouring numerical control system can be applied.



The Sad Tale of 1961 Production

Losses Are General as Production Drops 1 Million

Loss of 1 million cars in total production is a big factor behind the slump in steel.

But better things are indicated for 1962. A fast start on new models is encouraging.

By A. E. Fleming

▪ An estimate of 1961 calendar year car output shows one good reason why steel demand has been dragging through the year.

Assembly of U. S. cars for 1961 will total about 5.5 million. This is more than a million under the 6.7 million turned out in 1960. The loss in steel tonnage due to this decline is incalculable.

Losses Totaled—Every auto company will be far off its 1960 effort when the final 1961 figures are totaled. But the figures will show that General Motors Corp. dropped nearly 500,000 units below a year ago; Ford some 200,000; American Motors more than 100,000; Chrysler down around 350,000; and Studebaker-Packard Corp. around 25,000.

Only eight nameplates will show increases in production. And four of these are models which were not in production throughout all of 1960. Ahead will be Chrysler Corp.'s Lancer, by some 7000 units, and Chrysler by 13,000.

Ups and Downs — Ford Motor Company's Lincoln Continental is up by 15,000 and the Thunderbird by 3000. GM's Corvair is up by 60,000; Tempest by 80,000; the F-85 by 30,000; and the Special Buick by 60,000.

Only Chrysler, Lincoln and T-Bird are full size models. The others are compacts.

Big losers among individual models will be Chevrolet, down some 400,000 units; Ford down by 200,000; Dodge, 200,000; Pontiac, 175,000; Oldsmobile, 100,000; Valiant, 100,000; Buick, 75,000; Plymouth, down 50,000; and Mercury, down 50,000.

Brighter Outlook — But better things should be in store for 1962. At least, forecasters are saying so with guesses that production in the coming calendar year will range between 6.1 and 6.8 million. This means a pickup of from 600,000 to 1.3 million units over this year.

Booming car sales since the 1962 models were introduced at least give promise of 1962 getting under way with much greater strength than the first quarter of 1961. Then, slumping sales led to slumping production and widespread unemployment. At this time, the outlook for the first quarter of 1962 looks like it will be just the reverse of a year ago.

New Offerings—Contributing to the higher volume will be the new Fairlane and Meteor models of Ford Motor Co., known as "inbetweeners," and Chevrolet's Chevy II. The Fairlane and Meteor, especially, should show climbing production rates since their production start was delayed by the Ford strikes.

Meteor, for example, will have only 3000 cars in dealer hands by the end of November and may more than triple that figure by the end of December.

Where Production Dropped

Chrysler

	1961	1960
Valiant	120,000	231,500
Plymouth	200,000	252,400
Lancer	55,000	48,800
Dodge	170,000	362,300
DeSoto**	———	19,400
Chrysler	100,000	87,400
Imperial	14,000	16,800

Ford

	1961	1960
Galaxie	725,000	917,000
Fairlane*	50,000	———
Falcon	500,000	507,000
Thunderbird	90,000	87,200
Monterey	110,000	161,800
Meteor*	10,000	———
Comet	180,000	198,000
Lincoln	35,000	20,700

General Motors

	1961	1960
Chevrolet	1,200,000	1,614,000
Chevy II*	70,000	———
Corvair	320,000	259,000
Pontiac	245,000	418,200
Tempest	115,000	32,000
Oldsmobile	250,000	362,700
F-85	70,000	39,000
Buick	190,000	271,000
Special	100,000	36,700
Cadillac	150,000	159,000

American Motors

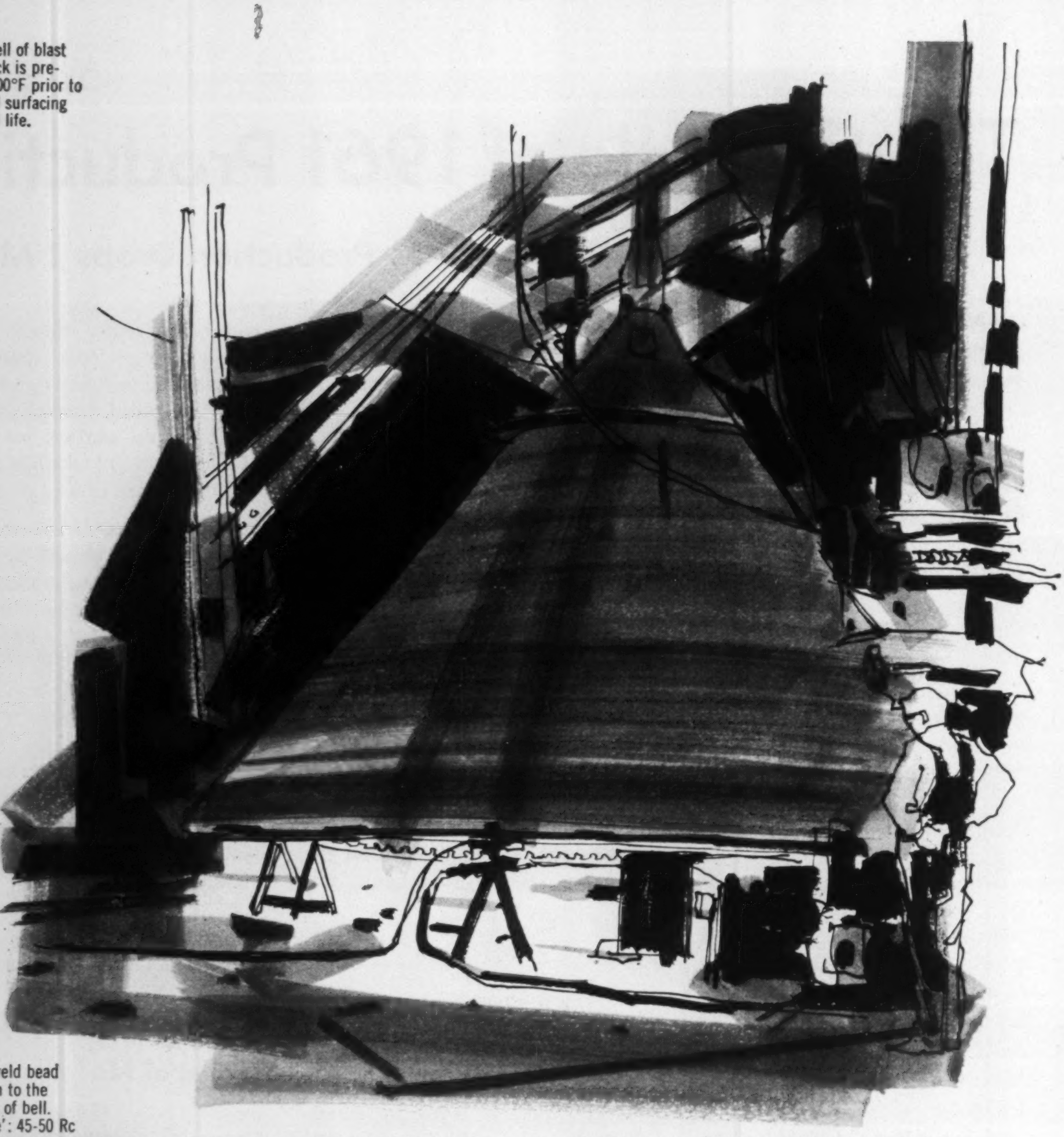
Rambler	370,000	485,745

Studebaker-Packard

	80,000	105,900

* 1962 Models Only
** Not made in 1961

■ Giant bell of blast furnace stack is preheated to 400°F prior to Mahon hard surfacing for renewed life.



■ A hard-weld bead is spiraled on to the working area of bell. 'New Surface': 45-50 Rc

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BUY “fabrication by Mahon”

Mahon's Steel-Weld Division constantly strives for better fabrication techniques—solidly developed out of long experience combined with broad-range facilities and wide-breadth capacity. *Example: new hard-coat (to 45-50 Rc) resurfacing* of worn steel parts for extended useful life. The Mahon method involves special submerged-arc welding, vertical milling and finish grinding. It is as applicable to high-wear new parts as it is to reconditioning older pieces. Why not look into how Mahon 'hard-surfacing' can be profitably used in the products you make or the equipment you use? We suggest you write to Mr. J. W. Ault, Manager of Mahon's Steel-Weld Division.

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Aluminum for Homes Pushed

E. H. Fickett: "We Need More Good Industrial Design"

Los Angeles architect is optimistic about prospects of aluminum in home building.

But he warns that its cost and the builders' knowledge about it are big factors.

By R. R. Kay

SALES MOUNT: Aluminum siding has become a hot seller. Last year U. S. producers sold 340 million sq ft. That's 170 million lb of aluminum sheet—a 200 pct hike in four years.

▪ Edward H. Fickett of Los Angeles, a nationally-known architect, has some ideas on how the aluminum industry might expand its home building market.

Mr. Fickett is well qualified to discuss the subject. He's chairman of the American Institute of Architects' Home Building Industry Committee. He's also consultant to Kaiser Aluminum's residential market development program.

He feels that aluminum producers are not concerned enough with their product's end use.

Overestimate Them — "They seem to think that everyone knows all about aluminum," Mr. Fickett says, "but that's not so." He thinks producers' literature to architects and builders should be more specific on where and how to use the metal.

"We also need much more good industrial design," Mr. Fickett says, adding: "That's what will add sales appeal to the metal for home building products."

Some products in design stages include aluminum wall and roof panels, easily fabricated, erected, and installed. "A very thin aluminum coating on a back-up panel with the proper baked enamel finish could possibly revolutionize home building," he believes.

Hold Costs—He also thinks the industry must strive to keep the cost of its product in line with competitive materials. Says Mr. Fickett: "I'm sure the public is willing to pay more for a low-maintenance, life-time material. But it can't afford to pay double the price.

"I don't think we're going to see many all-aluminum buildings," he adds. "But we will see more of the metal used with other building products. It's an exciting and durable material. There are scores of places for imaginative uses."

Mr. Fickett offers these tips to aluminum producers: Find out how much the average budget can afford for materials. Put a lot of creative thinking into design and manufacture of new products.

New Line — D. A. R. Rhoads, president of Kaiser Aluminum, says his firm is out to beef-up the use of aluminum in home building. Next year, Kaiser will bring out a new line of residential building products.

A total of 158 builders in Kaiser's residential market development program report that they used 369 lb of aluminum per house this year. The national average in 1960 was 185 lb.

STATION 4

Semi-finish bore shaft hole and cover bore. Rough generate cylinder face, recess.

STATION 5

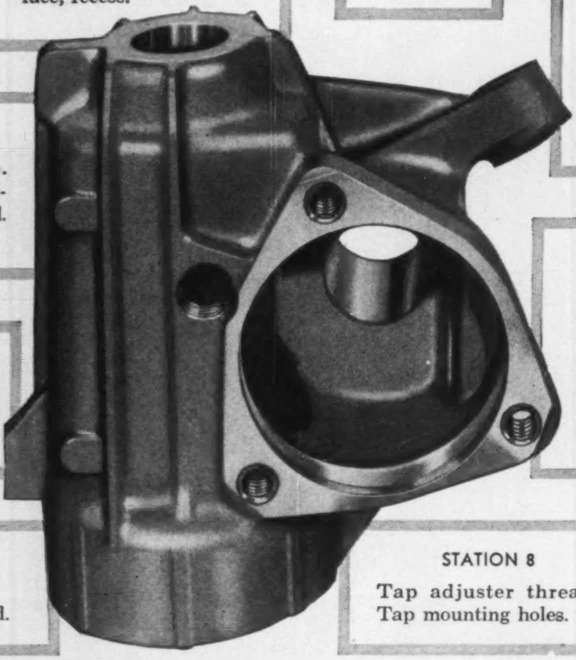
Idle.

STATION 6

Drill and countersink mounting holes. Semi-finish bore pilot hole, rough bore and chamfer bearing cup and seal diameters.

STATION 3

Generate cover face. Rough bore and chamfer for adjuster thread. Rough bore pilot dia.



STATION 7

Finish bore cover and shaft holes. Finish bump face side cover. Finish bore adjuster thread, pilot, bearing cup and seal diameters. Bump face cylinder.

STATION 2

Rough bore and chamfer cover hole. Rough bore Shaft Hole.

STATION 1

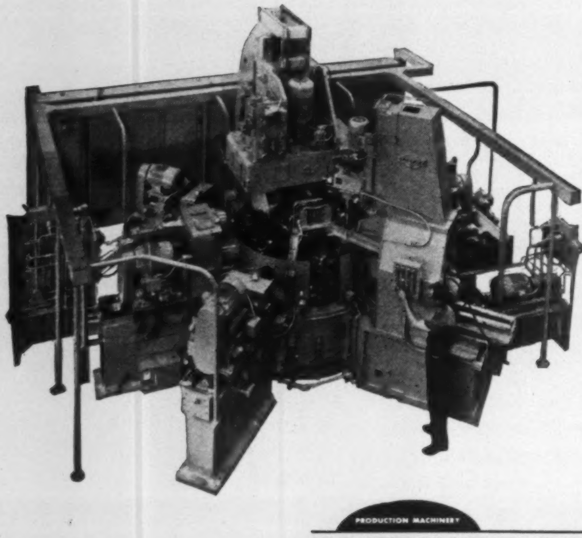
Load and clamp.
Unclamp and unload.

STATION 8

Tap adjuster thread.
Tap mounting holes.

153 Aluminum Steering Gear Housings per hour

automatically processed on this GREENLEE Machine



This Greenlee 8-Station Horizontal and Vertical Spindle Machine is establishing some excellent performance records for a leading automotive manufacturer. The 52 inch table carries 8 work fixtures. Each has power clamping. To insure rigidity and accuracy, the table is clamped hydraulically metal to metal. Indexing is fully automatic. Cycle time is 23.5 seconds. Like all Greenlee machines it's built for long, continuous service. Can be modified economically if desired. Have our representative give you complete information.

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Trade-in Policy Pays Off

Brown & Sharpe's plan, launched a year ago, has taken 100 obsolete machines out of circulation.

Competition from Common Market countries makes need for newer U. S. equipment vital.

By R. H. Eshelman

▪ About a year ago, Brown & Sharpe of Providence, R. I., launched a new trade-in program. The company allowed $500 for any old Brown & Sharpe automatic screw machine turned in for a new one.

Aim of the B & S plan was to eliminate obsolete and inefficient equipment in screw machine plants. George Hawkins, sales director of the B & S machine tool division, said surveys showed almost 50 pct of the single spindle automatics in use were from 10 to 20 years old. With recent advances in precision and production designs, these machines are comparatively inefficient.

When a plant buys a new machine, the old one often goes into the used machinery market. From there it finds its way into another plant. And soon it is again a drag on the nation's productivity.

100 Machines — Since B & S began its trade-in plan, about 100 antique automatic screw machines have been taken out of circulation. They have been replaced with modern, high-precision production units.

According to B & S vice president Wallace B. Bainton, his company's program has "helped stimulate interest in modernization" and has eliminated "some old clunkers."

"I recently checked one belt-driven unit of 1913 vintage," says Bainton, who is also general manager of the firm's machine tool division. "It was motorized and still in use."

Brown & Sharpe is taking no chances of recirculation of the worn-out trade-ins. They are consigned to scrap and go to a foundry cupola for remelting.

Other Methods — This is one attempt to stimulate plant modernization. Machine tool builders have tried others.

Some have offered credit support and long-term leasing to aid installment buying among smaller plants. Reception to these plans has been mixed. However, the plans prove that many machine tool builders in this country are trying to do something about America's diminishing production status.

Perhaps they will upset the prediction made recently at the packaging show in Detroit by an industry reporter from France. He sees the European Common Market as a levelling force in future world trade.

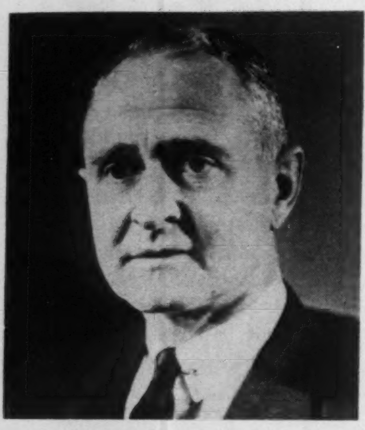
"Once we looked to you for leadership in mass production," he said, "but today we find the same machinery in your plants as our own."

Some Common Market countries have even newer equipment, he said. And Europe's labor costs may enable it to beat the U. S. in world markets, he added.

1962 Officers Elected by National Machine Tool Builders' Assn.

NEW TOP EXECUTIVES: National Machine Tool Builders' Assn. last week elected these men for 1962 (left to right): President, Francis J. Trecker, Kearney & Trecker Corp.; first vice president, Wallace E. Carroll, American Gage & Machine Co.; second vice president, Walter K. Bailey, Warner & Swasey Co.; treasurer, Lawrence C. Gleason, Gleason Works; secretary, R. R. Baldenhofer, Thompson Grinder Co.

MEN IN METALWORKING



G. C. Brooke, elected chairman of the board of directors, Birdsboro Corp.

R. W. Frank, elected president, Birdsboro Corp.

J. W. Collins, appointed president, Walworth Co.

Rockwell Manufacturing Co.—R. A. Schlegel, appointed president, Republic Flow Meters Co. subsidiary.

Alvey Conveyor Manufacturing Co.—R. H. Mayer, elected president; W. H. Oswald, appointed executive vice president.

Hastings Plastics, Inc. — A. L. Dames, elected vice president and a member of the board.

Northrop Corp.—T. H. Quayle, appointed corporate vice president, commercial and industrial programs; J. J. Ward, named vice president and manager, Systems Support Dept., Nortronics Div.

Permold Co. — J. J. Kroecker, named vice president-sales.

J. I. Case Co. — M. W. Reid, elected vice president-marketing.

Caspers Tin Plate Co.—H. W. Cochran, elected executive vice president.

Bradley & Vrooman Co.—C. P. Rommel, elected vice president, research and development.

Morgan Engineering Co.—C. F. Simmers, elected vice president, engineering.

Van Norman Industries, Inc.—D. H. Thure, elected executive vice president, and general manager, Bingham Stamping Div.

Walworth Co. — Hellmuth Strauss, named senior vice president; B. J. Hancock, named vice president, field sales.

Consolidated Systems Corp.—T. P. Morgan, elected vice president and director of operations.

Scullin Steel Co.—T. E. Padkins, named vice president, manufacturing; H. L. Simmons, named vice president, industrial relations and personnel; E. L. Kaiser, named vice president, finance.

J. A. Raterman, elected chairman and chief executive officer, Monarch Machine Tool Co.

K. T. Kuck, elected president, Monarch Machine Tool Co.

Datatrol Corp.—T. V. Cooper, Jr., appointed vice president and director, marketing.

Litton Systems, Inc. — R. W. Wright, named vice president, Westrex Recording Equipment Div.

Commonwealth Edison Co.—Nicholas Galitzine, elected vice president.

Cenco Instruments Corp.—P. C. Jackson, elected executive vice president, Instru-Coil Co. subsidiary.

Clonick Steel Co.—G. R. Winter, appointed vice president, Fabricating Div.

Leeds & Northrup Co. — A. E. Tarr, elected to the board of directors; J. M. Jackson, elected to the board, Leeds & Northrup, Canada.

(Continued on P. 68)

Garia oils are completely clear. Operators can see through the oil and keep a close watch on machining operation.

CUTTING:

Shell puts heavy-duty properties into transparent cutting oils that lengthen tool life three significant ways

Today, Shell's new Garia® Oils are helping machine shops improve metal finish and prolong tool life —even in heavy-duty cutting. And because Garia is transparent, operators can see the work at all times.

Read how Shell Garia Oils can reduce rejects, cut maintenance and overhead costs in your shop.

UNTIL RECENTLY, most heavy-duty cutting oils were opaque fluids which obscured the work.

Shell scientists took up the problem. They experimented with different formulae until they found the *exact combination* that retained the necessary properties—but did not seriously darken the oil.

Now Shell Garia Oils have the transparency of light mineral oils and the rugged qualities of heavy-duty oils.

With Shell's improved Garia Oils, operators can see through the oil film. Work can be inspected more easily.

Garia Oils prolong tool life in three key ways:

1. Garia Oils help prevent metal pick-up. Shell Garia Oils form a more effective film between the work and the tool. This provides better anti-weld protection, and helps prevent metal pick-up on tools.

2. Garia Oils help keep work cooler. Even with high-speed cutting, the metal stays cool.

Cooling helps extend tool life, and helps assure a better finish on the work. Operating costs are lower too.

3. Garia Oils wet faster. They reach the tool point rapidly, cover newly exposed surfaces quickly.

Compact range

Today's range of Garia Oils covers every kind of metal cutting operation.

Result: you do not have to carry large cutting oil inventories. You can do more jobs with fewer Garia Oils.

For all the facts, see your Shell Industrial Products Representative. Or write: Shell Oil Company, 50 West 50th Street, New York 20, N. Y.

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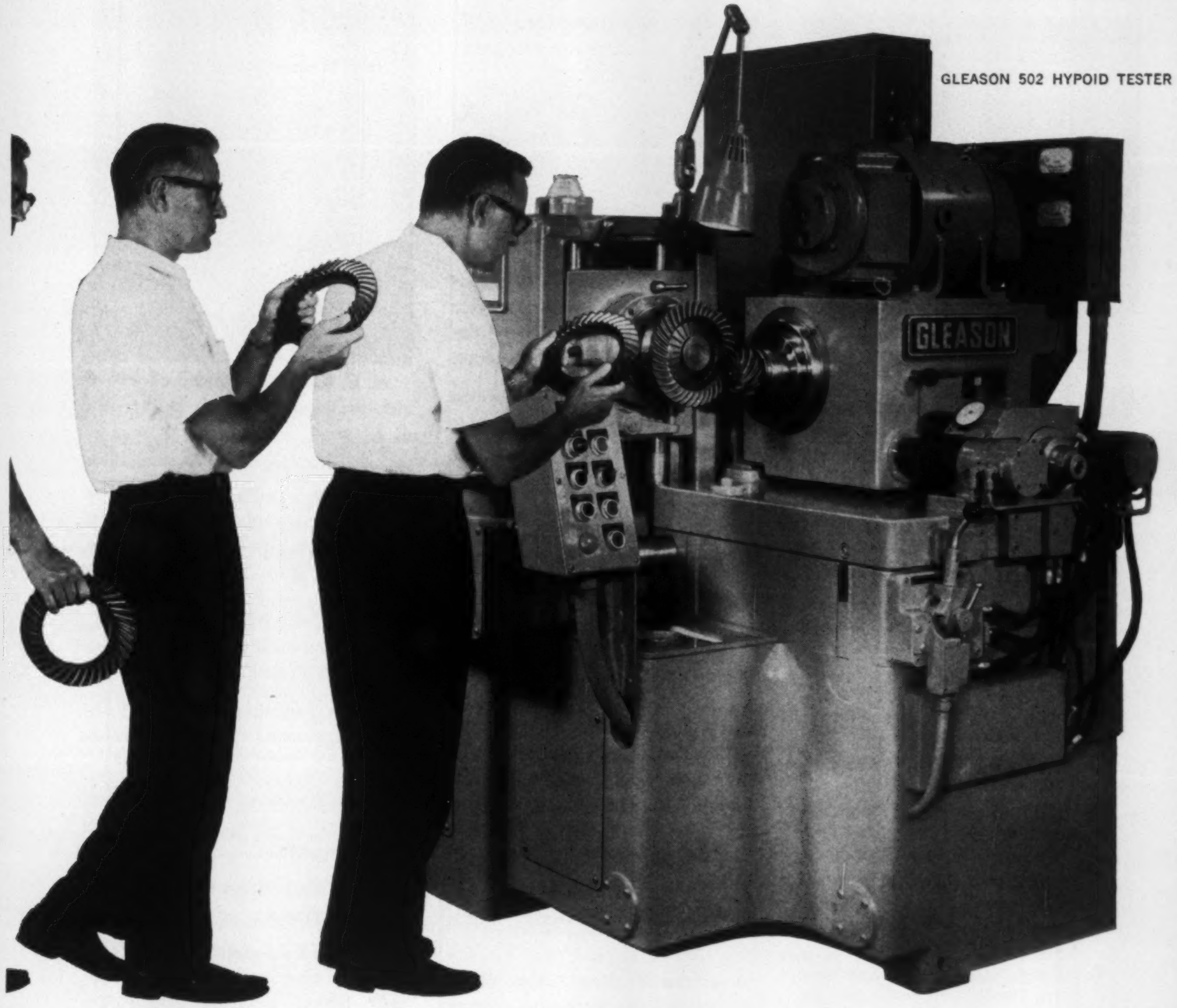
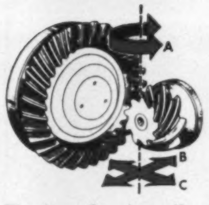
GLEASON 503 HYPOID LAPPER

NEW SPC* MOTIONS FOR PRECISION LAPPING AND TESTING





***Swing Pinion Cone** lapping motions—the swing motion of the pinion head "A" moves the bearing along the length of the tooth. The axial motion of the pinion head "B" moves the bearing up and down the tooth profile, while the motion of the pinion head in the direction of the gear axis "C" maintains constant backlash.

Designed primarily for testing and lapping automotive spiral bevel and hypoid gears and pinions, these new Gleason machines afford more accurate control than was ever before possible in other machines. The end result —consistent, highly refined tooth surfaces which deliver the ultimate in smooth, quiet running drives.

The Gleason 503 Hypoid Lapper employs an entirely new lapping concept . . . SPC (Swing Pinion Cone). While gear and pinion are rotating together in a flow of lapping compound, the pinion head automatically and continually swings about a vertical axis which passes through the center of the tooth mesh; reciprocates along the pinion axis; and reciprocates along the gear axis. This three-way action laps the entire surface of each tooth from heel to toe. All machine motions and lapping times are separately controlled for drive and coast sides . . . also, machine may be set for extra lapping time at heel or toe if desired. Positive control of backlash, brake load, and lapping motions assure accurate product duplication from machine to machine . . . from job to job. This greater flexibility, combined with the ease of set-up and extreme accuracy of the 503, make it superior to previous lapping machines. The 503 handles gears up to 10½″ diameter of any pitch.

The Gleason 502 Hypoid Tester is a companion machine to the 503 Lapper . . . simulates the SPC motions for accurately soft testing, matching, and final testing. Can also be run at spindle speeds up to 4000 rpm to approximate actual vehicle speeds. Handles bevel and hypoid gears up to 10½″ O.D.

For full information
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Rochester 3, N. Y.

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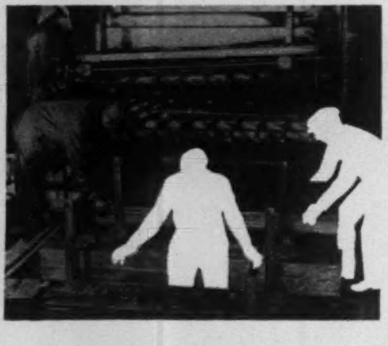

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(Continued from P. 64)

Van Dyck Associates, Inc.—J. F. Morten, elected executive vice president and director.

Power Designs, Inc. — J. K. Levin, appointed vice president-manufacturing.

Wheelabrator Corp.—G. D. Dill, named staff asst. to the president.

American Can Co.—R. D. McKirahan, appointed asst. to vice president, research, machinery development and new products dept.

Wheeling Steel Corp.—Howard Stephens, appointed asst. to vice president-sales.

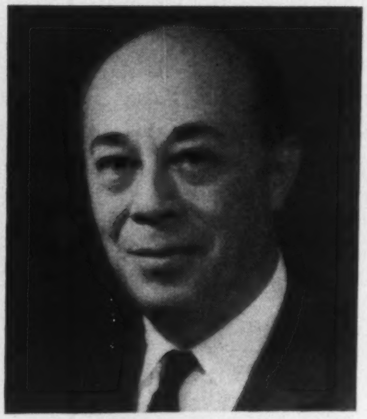
General Motors Corp.—M. F. Rummel, named director, purchasing and production control; H. C. Jackson, named director, purchasing; D. P. Duross, named production manager; J. Z. DeLorean, named chief engineer; J. P. Charles, named executive asst. chief engineer. All of Pontiac Motor Div.

Luria Brothers & Co., Inc.—G. J. Eline, appointed general traffic manager; W. R. Custer, appointed Cleveland district manager; J. A. Kelly, appointed asst. to the regional vice president, Cleveland.

Selas Corp. of America—K. A. Kirkby, appointed director, industrial relations.

American Brazing Alloys Corp.—David Mann, appointed comptroller.

G. J. Meyers, Jr., elected vice president, Hofmann Industries, Inc.



A. E. Kadell, appointed executive vice president, Screw & Bolt Corp. of America.

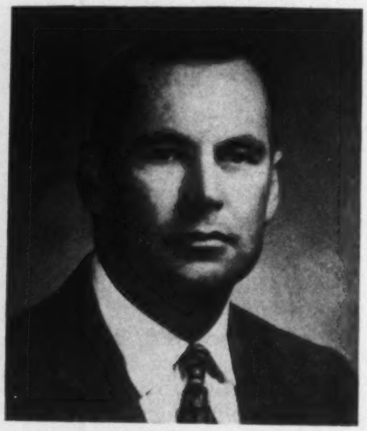
Allegheny Ludlum Steel Corp.—H. B. Conolly, appointed controller, Bar Products Div.; W. W. Dyrkacz, appointed div. manager, quality control; R. J. Pfisterer, appointed manager, Dunkirk, N. Y. plant; T. C. Sells, appointed manager, Watervliet, N. Y. plant.

Fulton Industries, Inc. — H. S. Smith, appointed director, purchasing.

Acme Steel Co.—T. J. Fullerton, appointed director, New Products Development Div.

DoAll Co.—John Suerth, named product manager.

Lockheed Aircraft Corp.—H. W. Pochyla, appointed asst. to the manager, Special Services Div., Lockheed Aircraft Service.



S. E. Soule', named executive vice president, Soule' Steel Co.

Westinghouse Electric Corp.—R. A. Vollmer, appointed director, financial planning and control.

Page Communications Engineers, Inc.—A. A. Blanco, appointed director, marketing, plans and proposals; E. A. Schneider, named Washington, D. C. marketing representative.

Circo Corp. — Edmund Malone, appointed manager, Chemical Products Div.

Fischer & Porter Co.—E. F. Upton, Jr., appointed director, engineering.

Thiokol Chemical Corp.—Dr. D. J. Mann, appointed director, research, Reaction Motors Div.

North American Aviation, Inc.—Dr. W. T. Clary, named director, systems research, Information Systems Dept.

Chrysler Corp.—R. M. Cooper, named chief engineer, body-in-white, and H. W. Smith, named chief engineer, body components and trim, Engineering Div.

Climax Molybdenum Co.—R. R. Freeman, named manager, marketing; N. L. Deuble, appointed asst. to the general manager; C. H. Kromer, appointed financial manager. All of Refractory Metals Div.

Kennecott Copper Corp.—C. G. Lindquist, appointed asst. director, and Dr. Louis Gold, named staff scientist, Basic Research Laboratory.

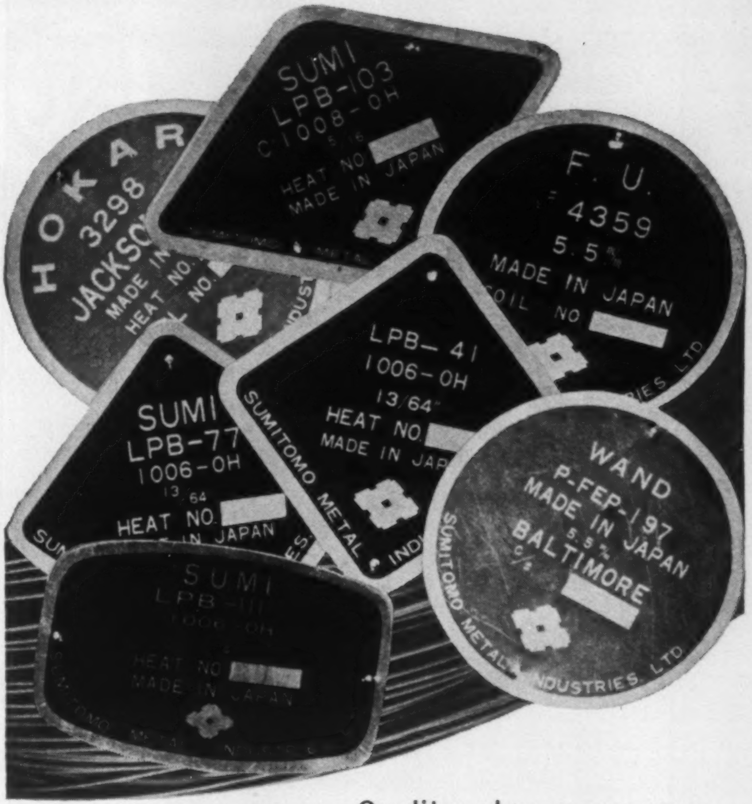
United Technical Industries—Dr. William Kirkpatrick, appointed director, research and development.

Ajax Magnethermic Corp.—R. S. Segsworth, appointed chief engineer, Trenton, N. J.

Martin Co.—D. W. Chrisman, appointed director, planning, Electronic Systems and Products Div.

Hyster Co. — Harvey Raasch, named director, marketing, European operations, International Div.

Eaton Manufacturing Co.—D. G. Triponi, appointed chief metallurgist, Marion Div.



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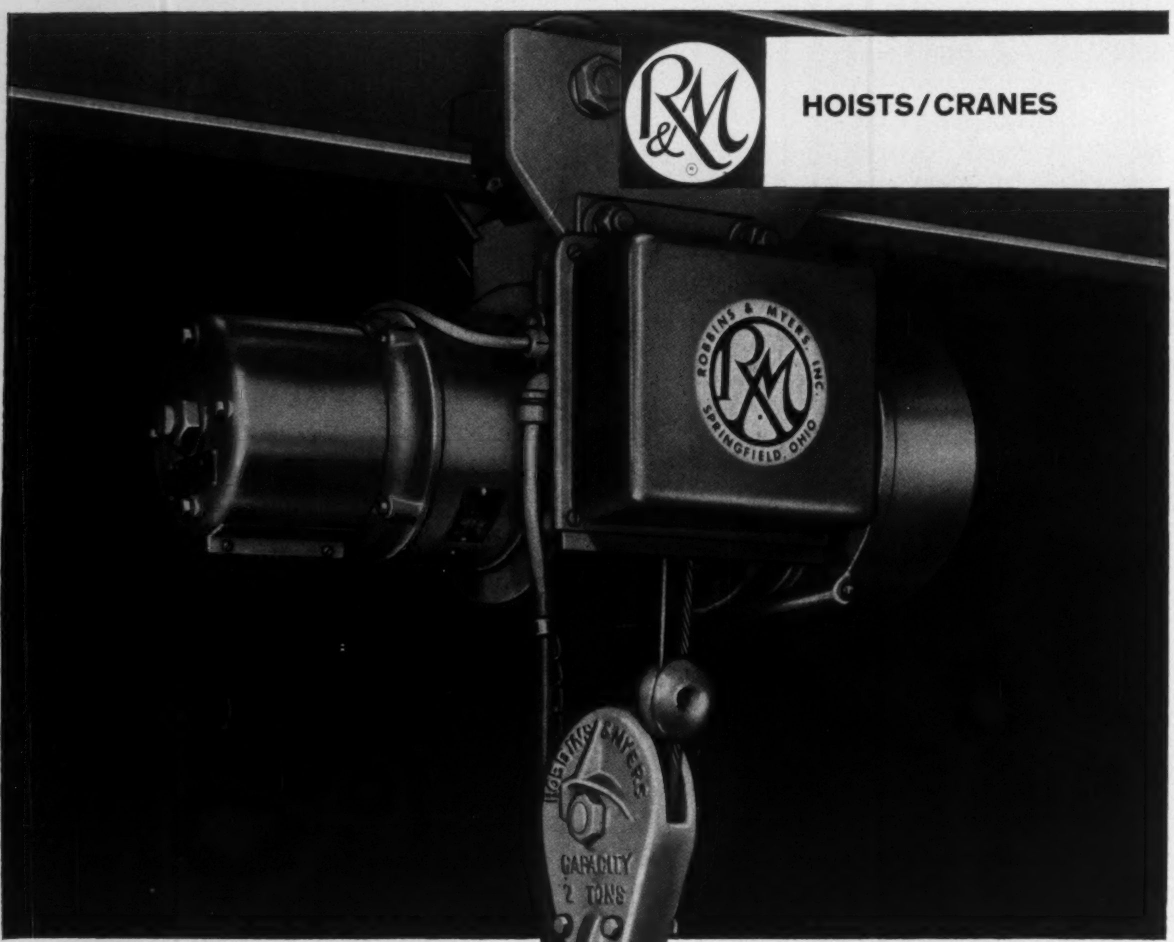
HOISTS/CRANES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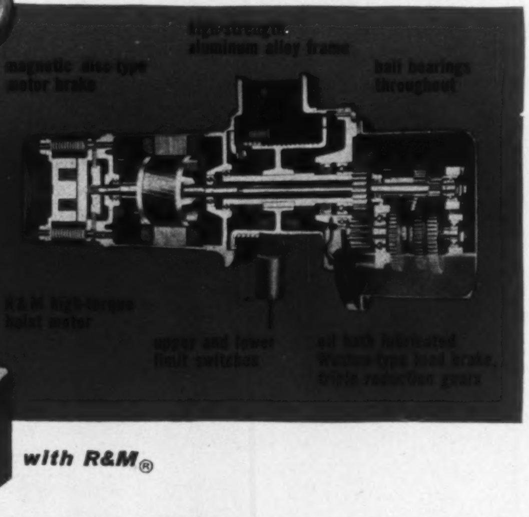
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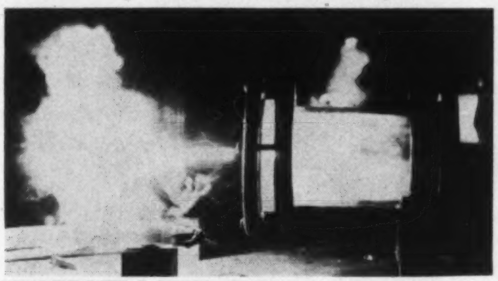
Subsidiary companies at: Memphis, Tenn., Pico Rivera, Calif., Brantford, Ontario.

Study Impact on Metals

Little is known about the population and effects of micrometeorites in space. However, Technical Operations Inc. has a unit that should put a few well-placed dents on the subject. It's a super-voltage exploding-wire gun. The unit lets go with Mylar pellets at speeds above 20,000 fps. Impact effects on aluminum, stainless steel and some exotic metals are being studied.



HYPERVELOCITY GUN: Aids space studies.

Guarantee On Bearing Life

Aerospace equipment makers can now be assured a "safety zone" life span for roller bearings. By conducting a great number of endurance tests, SKF Industries, Inc., set up a life distribution which predicts the frequency of failures in any given range. Designing bearings for the short safety zone period would be uneconomical for most applications. Where human lives are at stake, the testing method offers 100 pct protection.

Quest For New Materials

A nuclear rocket operating in the upper stage of Saturn would double or triple orbital payloads. So say atomic scientists at several research labs. Nuclear rockets afford greater simplicity and reliability. However, materials capable of operating at high temperatures in outer space present the most difficult problems ahead. Design and technical know-how for nuclear rockets have already been worked out.

Simulates Solar Radiation

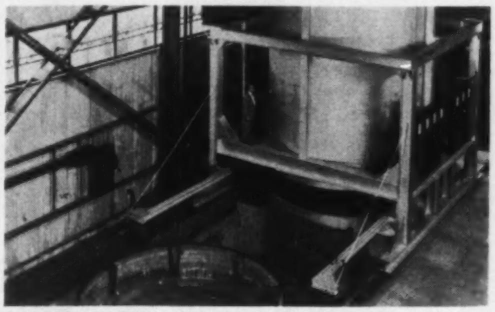
Solar radiation beyond the earth's atmosphere can be simulated in an environmental space chamber by using a bank of carbon arcs. The carbon arcs bathe the chamber in both visible and invisible light. Researchers at National Carbon Co. used a spectrophotometer to measure the radiation distributed by the carbon arcs all the way out to 150,000 angstrom units. The data were then plotted against a curve showing the sun's spectral energy. The two curves follow each other very closely over the entire range.

Exotic Ingots Get Larger

Giant missiles and spacecraft, now on the drawing board, call for many exotic metal parts larger than any used before. Temescal Metallurgical Corp. produces a 6-ft long, 7-in. diam ingot containing 90 pct Ta and 10 pct W. Its total weight is 1500 lb. Large ingot production is the result of a newly designed electron-beam furnace. The three-story high furnace can produce a million pounds of metal per year.

Furnace Handles Nova Parts

This giant heat treating furnace took a year to build. But it's ready to handle huge rockets and missiles in the Nova league, says a spokesman at the J. W. Rex Co. The 40-ft high furnace has a 16-ft OD. Parts are electrically heated to 1850°F, quenched in air, oil or salt, then tempered in a pit to 1250°F.



GIANT FURNACE: Puts the heat on missiles.

NASA Pushes Moonshot

A big push is on to speed up the U. S. moonshot program. NASA is studying orbital refueling to hurry the job of getting a three-man craft to the moon. Successful orbital refueling could cut a year off the schedule. Contract for the lunar spacecraft is expected to be awarded before the year's end. Meanwhile, says Dr. Von Braun, U. S. space expert, scientists are looking for ways to cut more moonshot time by skipping some planned pre-lunar launchings.

A roll's life holds no secrets

Men like National's metallurgist Joe Marsalka see to that. Before your roll is born, National helps select the proper composition, grade and hardness. As it is being produced, our metallurgists carefully control chill locations, pouring procedures and heat treatment. When the roll is "full-grown" ultra-sonic testing equipment checks its internal soundness making sure your roll is ready for the tough life ahead. Even after your roll is shipped, National keeps in touch with its performance in your stand. This intimate knowledge of roll life is one reason we are able to consistently produce quality steel, iron and nodular iron rolls. It's a big reason why... NATIONAL'S THE GROWING NAME IN ROLLS.

NATIONAL ROLL & FOUNDRY DIVISION

GENERAL STEEL INDUSTRIES, INC., Avonmore, Pennsylvania

General Steel Industries, Inc., General Offices: Granite City, Ill. Plants: Granite City, Ill., Eddystone, Pa., Avonmore, Pa.
Subsidiary: St. Louis Car Company, St. Louis, Mo.

How Much Job Specialization Can Assembly Lines Take?

Hidden costs often arise whenever progressive assembly work is performed on a conveyor.

An item to watch is the cost of non-productive work induced by the division of labor.

- Minute job specialization on assembly lines has been practiced for many years. Certain costs, such as wages and training, can be reduced as the job itself is broken down and deskilled. There is logic to this theory, but it can be carried too far.

Some costs do decrease as job breakdown proceeds. Other costs, however, such as the cost of non-productive work, tend to spiral. Beyond a certain point the total assembly cost might even increase, defeating the purpose of further job specialization.

Many factors join in determining this optimum point. The search for an analytical method of determining the extent to which the assembly task should be broken down is called the "cycle time problem."

Non-Productive Work—One of the chief factors in optimum cycle time is the amount of non-productive work induced by the division of labor. In assembly lines, non-productive work takes many forms. Included are handling of product and tools and operator movement to and from the work position.

At a recent seminar held at Armour Research Foundation, Chicago, the problem was examined in the light of actual field data. The companies studied were engaged in the assembly of TV chassis.

Here are some of the findings. As individual assignments get smaller and smaller, you reach a point at which the cost of non-productive work exceeds the savings resulting from the division of labor. These results show that for powered conveyor work such a cross-over point isn't reached within the range of feasible cycle times.

Two-Minute Cycle—For non-powered conveyor lines, on the other hand, the division of work beneath the point of a two-minute cycle results in high cost of non-productive work. This can reach a height of 15 pct of direct labor cost for very short cycles. In practice it's possible to extend the division of work to a costly point.

The percentage of non-productive work time increases sharply in powered conveyor lines for cycle times less than one minute. This increase is also noted in non-powered lines with cycle times under two minutes.

Both companies studied were

What Happens in Powered Conveyor Lines

Analysis of Productive and Non-Productive Work in the Assembly of a 21-in. TV Chassis on Powered Conveyor Lines for Various Assembly Cycles (Company A) Time in Minutes

		Non-Productive Work Content Time							
Number of Stations or Operators (1)	Productive Work Content Time (2)	Product Handling (3)	Tool Handling (4)	Return to Position (5)	Extra Component Allowance (6)	Total Non-Productive Work Content Time (7)	Total Work Content Time (8)	Non-Productive of Total Time, pct (9)	Cycle Time (10)
1	59.67	0.69	1.51	....	0.70	2.90	62.57	4.63	62.57
2	59.67	0.75	1.51	....	0.70	2.96	62.63	4.73	31.32
3	59.67	0.80	1.51	....	0.70	3.01	62.68	4.80	20.89
4	59.67	0.72	1.51	0.02	0.70	2.95	62.62	4.71	15.66
5	59.67	0.72	1.51	0.03	0.70	2.96	62.63	4.73	12.53
10	59.67	0.72	1.51	0.08	0.47	2.78	62.45	4.45	6.30
15	59.67	0.72	1.51	0.13	0.23	2.59	62.26	4.16	4.15
20	59.67	0.72	1.51	0.18	....	2.41	62.08	3.88	3.10
30	59.67	0.72	1.42	0.28	....	2.42	62.09	3.90	2.07
60	59.67	0.66*	1.34	0.57	....	2.57	62.24	4.13	1.04
143	59.67	0.78	1.37	1.39	....	3.54	63.21	5.60	0.44

* The inconsistency of product handling time for the 60-man line is due to the use of an assembly fixture at the start of the line. At a one-minute cycle handling of this fixture is minimized.

Non-Powered Lines Point Up Evidence

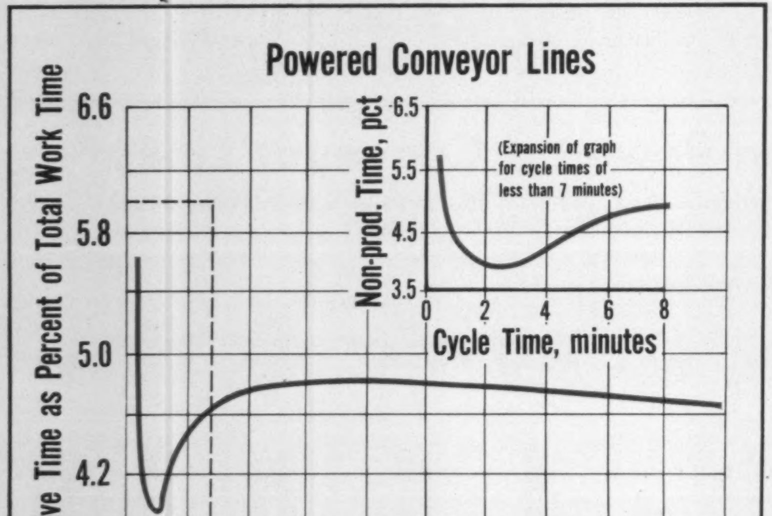
Analysis of Productive and Non-Productive Work in the Assembly of a 21 In. TV Chassis on Non-Powered Conveyor Lines for Various Assembly Cycles (Company A) Times in Minutes

		Non-Productive Work Content Time						
Number of Stations or Operators (1)	Productive Work Content Time (2)	Product Handling (3)	Tool Handling (4)	Extra Component Allowance (5)	Total Non-Productive Work Content Time (6)	Total Work Content Time (7)	Non-Productive Time of Total Work Time, pct (8)	Cycle Time (9)
1	59.67	0.69	1.51	0.70	2.90	62.57	4.63	62.57
2	59.67	0.75	1.51	0.70	2.96	62.63	4.73	31.32
3	59.67	0.80	1.51	0.70	3.01	62.68	4.80	20.90
4	59.67	0.85	1.51	0.70	3.06	62.73	4.88	15.68
5	59.67	0.91	1.51	0.70	3.12	62.79	4.97	12.56
10	59.67	1.17	1.51	0.47	3.15	62.82	5.01	6.28
15	59.67	1.43	1.51	0.23	3.17	62.84	5.04	4.19
20	59.67	1.69	1.51	....	3.20	62.87	5.09	3.14
30	59.67	2.21	1.42	....	3.63	63.30	5.73	2.11
60	59.67	3.62	1.34	....	4.96	64.63	7.67	1.08
143	59.67	8.01	1.37	....	9.38	69.05	13.58	0.48

supplied with operations analysis sheets. These sheets showed each element of work performed on the line and the standard time required to perform it. From the sheets, it was possible to sort out the productive from the non-productive elements of work.

Separate Steps—Handling and return-to-position times were separated from the productive work elements. The relationship between length of cycle and amount of non-productive work was then determined. The survey covered 11 each powered-conveyor and manual-conveyor cases in the first company and five powered cases in the second company.

Cross-Over Point Is Defined



Company A was assemblying a 21-in. TV set. Total work content was about 62 minutes. Company B used its five lines to assemble the chassis of a smaller TV set. Work time there was about 52 minutes.

Chassis assembly consists of placing and fastening small electronic parts, lacing them together with wires and soldering the wire connections. Most of this work is done by women who are seated side by side at the line.

All non-productive work was classified under four headings. They included product handling, tool handling, return-to-position and station-size allowance.

Powered Lines—The first table shows the productive and non-productive work in the assembly of a 21-in. TV chassis on powered conveyor lines for various assembly cycles. The productive work content time (column 2) and the total non-productive work time (column 7) add up to total work content time. This is found in the eighth column.

The ninth column shows the non-productive time as a percent of total time. The cycle time of column 8 is found by dividing the total work content time by the number of stations or operators in the first column.

In the first graph the non-productive time as a percent of total time is plotted as a function of cycle time. That part of the curve which corresponds to cycle times of less than eight minutes is expanded in the insert at the upper corner.

What Does It Prove?—This graph shows that non-productive time on powered conveyor lines in this company is minimal for cycle times of about 2½ minutes where it reaches a low of about 3.7 pct of the total work time. From there it rises about 1 pct as it nears a six-minute cycle. It remains constant at about 4.7 pct as the cycle time increases to 63 minutes.

On the other hand, as the cycle time decreases beyond 2½ minutes, the percent of non-productive work increases slowly to about 4.1 pct at a one-minute cycle. It's less for cycle times of less than one minute.

At a one-half minute cycle it reaches about 5.6 pct. By extrapolation of the curve, it would probably reach 10 pct for a one-quarter minute cycle.

Dramatic to the Eye—A dip appears in the curve of the first graph between cycle times of about one to six minutes. Although it looks dramatic because of the scale used, it represents a drop of less than 1 pct in non-productive time. It's caused by the decreasing station-size allowance time for the compact work stations which use short cycle times.

For cycle times of less than one minute this savings in station-size allowance time is offset by an increase in other non-productive time. This increase moves the curve up sharply. For cycle times of over six minutes the four kinds of non-productive work fall into a total balance.

For cycle times ranging from about 63 minutes (a one-man operation) to about 0.40 minutes (143 operators) the total non-productive time varies by only 2 pct. Within this range of cycle times it has a high of 5.7 pct and a low of 3.8 pct. Only when the cycle time gets down to about 15 seconds or less does non-productive work become a vital cost factor.

Careful, Now—Don't misinterpret the data in the first table. The total work content time is shown to be 62.57 minutes per chassis if a single operator does all the work. Twenty workers will provide a minimum value of 62.08 minutes.

Why then set up a line and incur the problems of line operation rather than have multiple one-man stations? The answer is that the data assume all other factors are held constant. This, of course, is an impossible situation. Non-productive time is only one factor in determining the optimum extent to which the task should be broken down.

Four cost factors are involved. They are learning, non-productive work, balance-delay and quality-loss. That's why you can't make correct inferences about the best division of work from a study of non-productive time alone.

Manual Lines—In the second graph non-productive time as a percent of total time is plotted as a function of cycle time for the case of non-powered conveyors. These figures have been transposed from the second table. The graph shows that the cost of non-productive work moves up sharply for cycle times less than two minutes.

It reaches about 13 pct of assembly time at a one-half minute cycle. For cycle times of three minutes and over non-productive time remains constant at about 4.8 pct. For cycle times of less than two minutes, therefore, non-productive work is a vital cost factor for work done on non-powered conveyors.

In cycle times shorter than two minutes, say to a minimum cycle of about one-third of a minute, the cost of non-productive work rises to about 15 pct of assembly labor cost.

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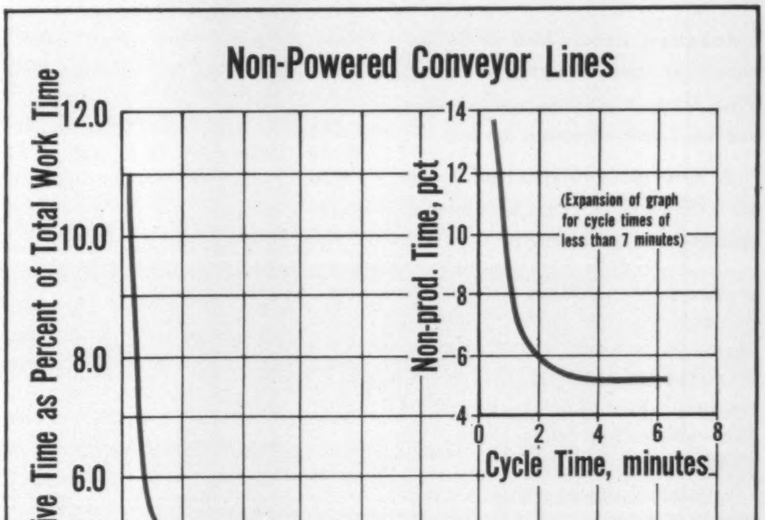
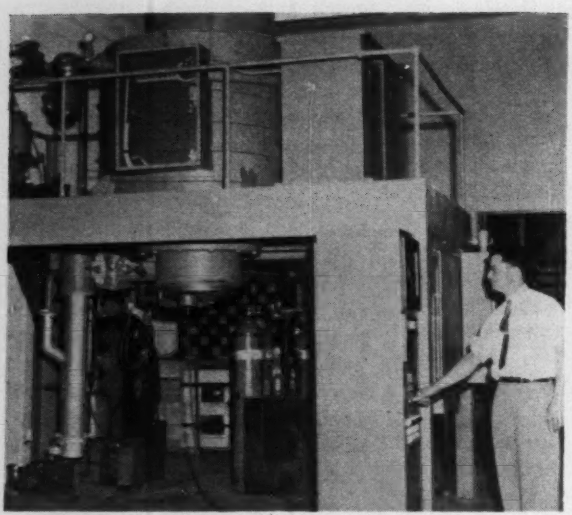
Curves Follow Like Patterns





VACUUM CURING: Carbon-zircon bonds form, as organic resins in the molds decompose at 1650°F.

SPECIAL MOLDS: Standard equipment is used to prepare the carbon-bonded zircon-sand molds.

Produce Gas-Free Castings In Chemically-Inert Molds

By **G. D. Chandley**—Supv. Prod. Metallurgist, Ordnance Corps, Watertown Arsenal, Watertown, Mass.

Reactive metals and many superalloys prove hard to cast. Even in a vacuum, most molds evolve contaminating gases.

A new mass-production process turns out carbon-bonded, chemically-inert molds.

▪ An entirely new concept in making metal-casting molds has been devised by Mr. B. W. Crocker of Watertown Arsenal. This mass-production process hinges on the use of only one binder with a zircon refractory.

Special treatment yields a bond that's completely insensitive to a vacuum. As a result, no gases are liberated during subsequent casting operations.

The new molding process offers a solution to the many casting problems posed by reactive metals. Mr. Crocker states: "For years, people who make reactive and superalloy castings have sought a way to make molds which are dimensionally accurate, chemically inert, and don't evolve gaseous products during casting."

What's Left? — Pure carbon is used with the new process to bond fine zircon refractories. The only major constituents left in each mold after curing are amorphous carbon and the refractory. The mold will not react with most molten metals. This is why it performs so well in a vacuum.

Titanium, uranium, aluminum, bronze and various steel alloys have been poured into the carbon-bonded molds. All results were successful.

The molding process is simple. First, shell or solid-mold halves are formed. Conventional shell-mold machines handle this work.

In forming the shells, an organic binder is mixed with the zircon sand. This binder coats all sand particles. Heat sets this phenol-formaldehyde resin binder.

Alternate Binder—Furan resins may be used as an alternate binder material. If they're used, a catalyst must be employed to set the binder.

After the molds or cores are bonded, they enter a vacuum furnace. Under a vacuum of 20-30 microns — about 0.000025-0.000040 atmospheric pressure — they're heated to 1650°F.

During this heating stage, a great evolution of hydrocarbons takes place. These hydrocarbons can contaminate the vacuum system. Therefore, precautions must be employed in collecting them.

Next, the molds are allowed to cool in the vacuum until their temperature falls to about 400°F. Mold halves may be bonded together while they're still hot. Or, if you desire, you can bolt the mold sections together.

Easy to Support — During the bake-out cycle, the molds retain good strength.

Optimum mold mixes have yet to be developed. However, by blending AFS #130 zircon sand and zircon flour with 7-12 pct phenol-formaldehyde shell-mold resins, we obtain molds with widely varying properties.

As mentioned previously, a furan resin may also be used. Use of 2-5 pct of this resin (by weight) with AFS #130 zircon sand produces molds and cores that don't react with most molten metals.

Among the first castings made in carbon-bonded molds were flash suppressors for the M-85, 0.50-caliber machine gun. Normally, this item is cast in FS 8630 steel.

Titanium Too — Other metals were successfully cast in the same suppressor pattern. These metals include bronze, aluminum, titanium and FS 1020 steel. In every case, there is no visible breakdown of the carbon-bonded molds.

Molten steel won't break the mold unless air contacts a red-hot mold. Of course, none of the mold-preparation conditions were optimized for this early work.

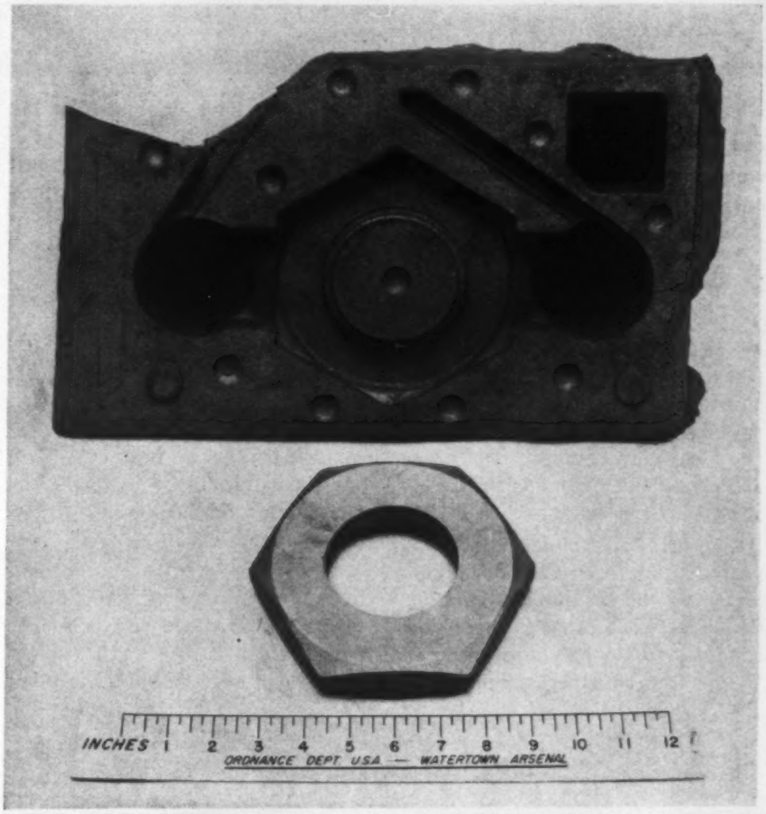
Hot strength often causes trouble in casting. In many cases, desired mold properties must be inherently built into the mold itself. Tailored carbon-bonded mold mixes are still being studied.

Other Results—One of the illustrations with this text shows two small latch castings and half of a latch-casting mold. This carbon-bonded mold was made on a standard shell-mold matchplate. The latches were cast in FS 8630 steel. They're used to attach a 7.62-mm, M-60 machine gun to its tripod.

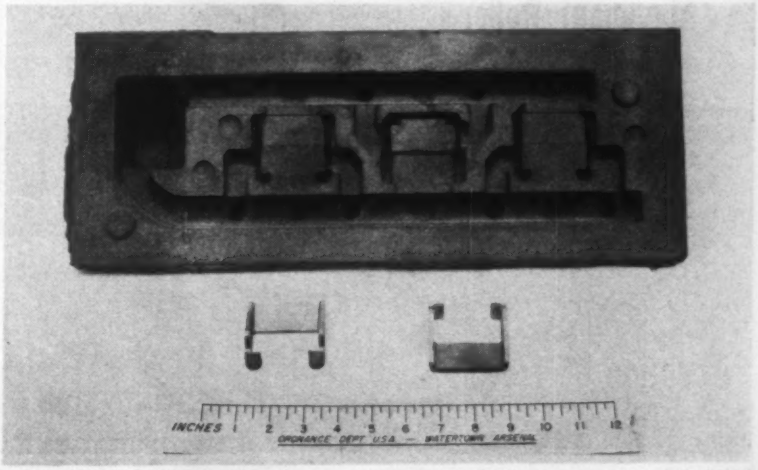
Another figure shows a large cast nut and half its mold. This nut is made from FS 1020 steel. The carbon-bonded mold was produced on a shell-mold matchplate.

Possibilities for the new carbon-bonded molding process have barely been explored. Work is continuing at the Arsenal. The aim: To refine the process and make it more widely applicable to the multifarious metal castings used by the Army Ordnance Corps.

Patent applications are in the works. After these patents are obtained, any foundry will be able to get a license to use the carbon-bonded molding process.


INCHES 1 2 3 4 5 6 7 8 9 10 11 12
ORDNANCE DEPT. USA — WATERTOWN ARSENAL

MILD STEEL NUT: Large nut casting and half its mold were made from a shell-mold matchplate. This nut was cast in FS 1021 mild steel.


INCHES 1 2 3 4 5 6 7 8 9 10 11 12
ORDNANCE DEPT. USA — WATERTOWN ARSENAL

LATCH CASTINGS: Machine-gun attachment latches are cast in FS 8630 steel. Half of the carbon-bonded mold for these parts is also shown.

Synchronized Welding Joins Tubing From Both Sides

By **J. A. Seme**—Chief Engineer, Swepco Tube Corp., Clifton, N. J.

Tubing is usually welded from one side only. This new approach welds from both the inside and outside.

Roll forging adds a finishing touch to the job.

▪ What is there about a section of high-alloy, welded tubing that puts it in the quality class? The general appearance of the weld is certainly one factor. Good fatigue strength is another consideration. Superior ductility is a third factor.

Consider for a moment the conventional approach to welded tubing. Here the seam is joined from one side. What proof is there that complete fusion has been effected? We know from experience that service failures have originated in the root of the weld.

At Swepco, we have developed a new welding technique which eliminates the root of the weld. It is called the Syncro-Weld process. Fusion is performed from the outside and the inside in a sychronized pattern.

Compressed Welds — Shortly thereafter, compression rollers move across the weld seam. These rollers perform two functions. They are shaped to the contour of the pipe. Both weld faces are compressed simultaneously.

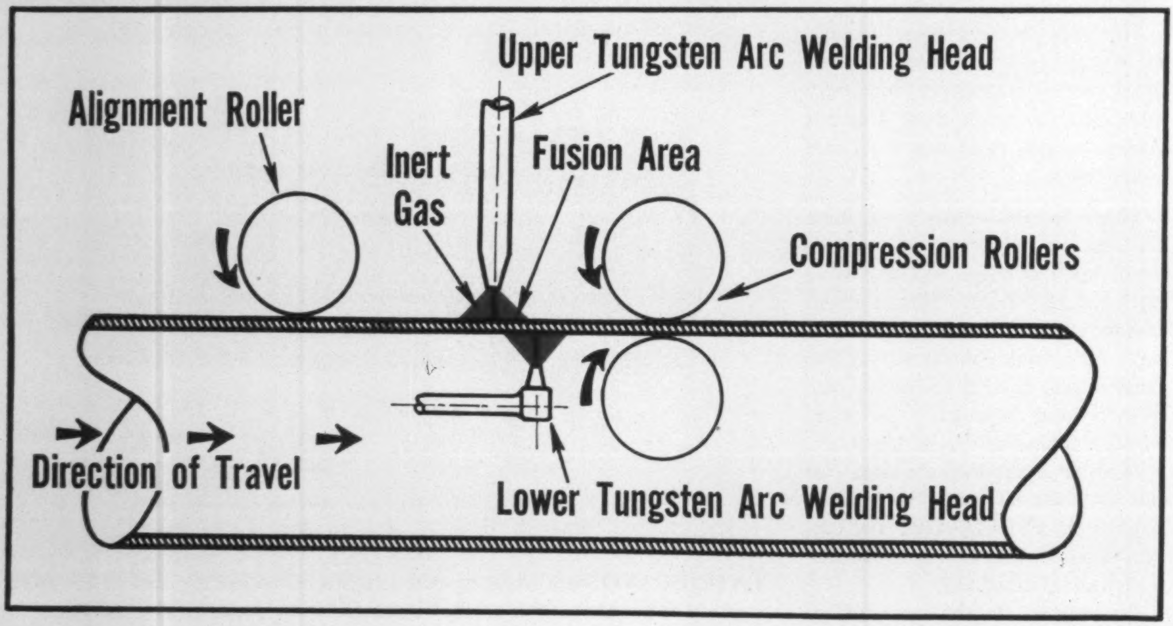
The process itself makes full use of automatic Tig welding. Both torches are mounted vertically. The outside torch furnishes a downward arc. The inside torch, on the other hand, arcs upward. The latter torch is positioned slightly behind the outside setup.

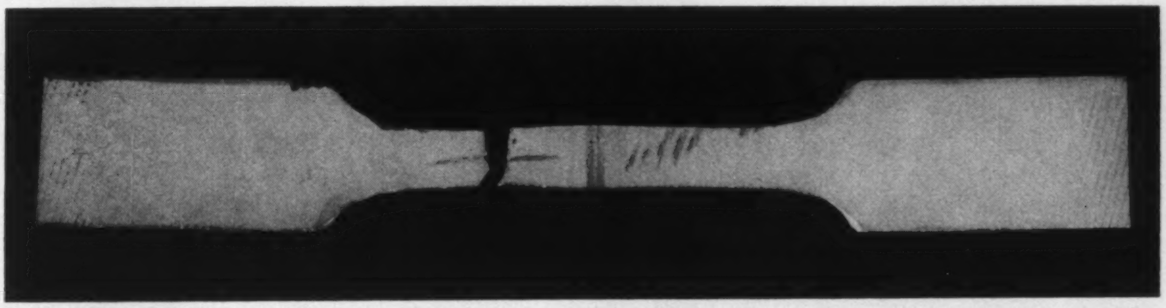
No filler metal is added. The heat from the Tig welding torches merely coalesces the longitudinal seams. The joint design is a square-groove butt joint. As a result, the geometry resembles a double butt weld.

Ductility Comes First — For a tubular product to withstand high pressures and temperatures, the weld must be ductile. To obtain ductility, the weld should cool uniformly. When a weld seam is heated by a welding arc, it will expand. When it cools, it will contract. It is at this point that shrinkage stresses start to build up.

The Syncro-Weld joint is very symmetrical. This, in effect, pro-

Roll Forging Perfects Tig Welded Joint





TENSILE TESTS: Results from tensile tests show that rupture occurs in parent metal, not in the weld. Good results are also noted with such mechanical properties as elongation and reduction of area.

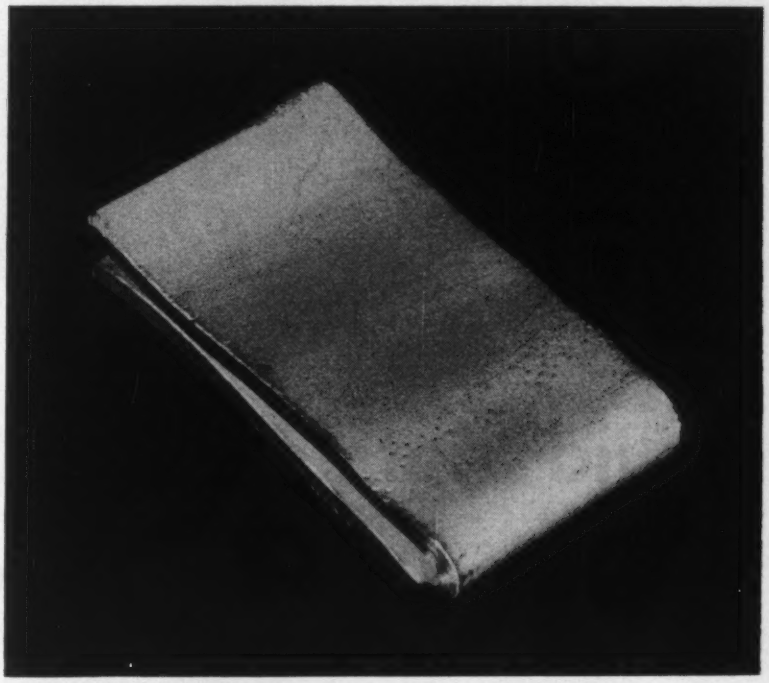
vides uniform cooling. As such, plastic yielding is diminished; shrinkage stresses are also reduced. The end result is a more ductile weld.

A pipe line that is subjected to cyclic temperature changes and vibrations must possess good fatigue strength. Improved fatigue strength is found in Syncro-Weld joints. Geometrical stress raisers are eliminated, such as surface irregularities, root of weld, overlaps and undercuts.

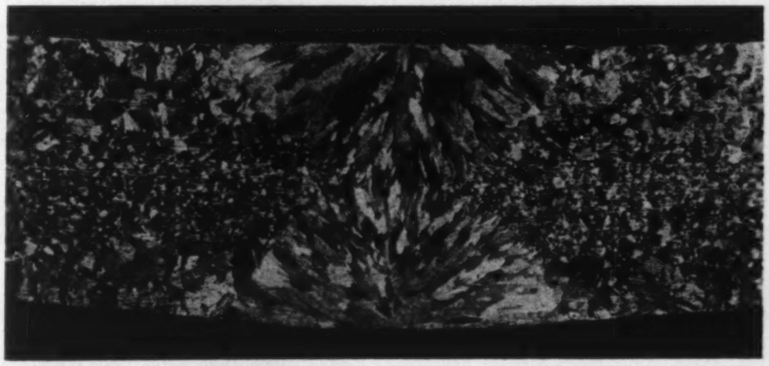
Higher Ratings—The weld also provides a higher percentage of joint efficiency than the minimum required by codes. A single-welded butt joint provides a certain rating, but a much higher rating can be achieved from a double-welded butt joint. Pipe with thinner walls can then be used to contain the same pressures.

The improvement in mechanical properties is best seen in flattening and tensile tests. In the flattening tests, no metal separation or cracks develop at the greatest point of strain. The tensile tests are proof of the fact that ruptures occur in the parent metal and not in the weld area.

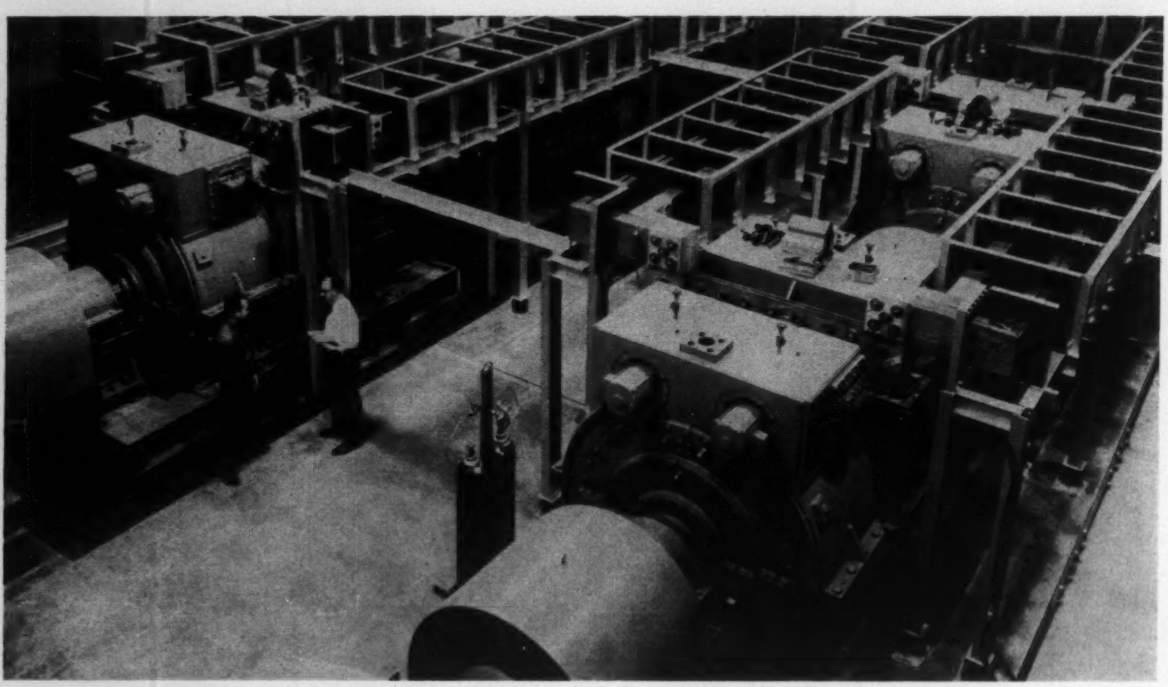
Since coalescence is affected without filler metal, a consistent chemistry prevails in the weld area. In addition, the compression rollers provide a smooth surface to the weld. This is added insurance against any attack by corrosive media.



FREE OF CRACKS: Flattening tests are clear indication that no metal separation or cracks develop at the greatest point of strain. The main reason for such ductility is the uniform cooling of the fused area.



CONSISTENT CHEMISTRY: Micro of double-vee weld in Type 304 stainless shows consistent chemistry at the joint. X 11. Etch: $HCl\text{-}H_2O_2$.



ON SITE: Four acyclic generators are providing the current for the USAF's "hot shot" wind tunnel.

Liquid Metal Turns the Tide To High DC Generation

A new generator can provide high direct current at very low voltages.

Key to the breakthrough is a liquid-metal collector.

▪ Development of a new dc generator which provides extremely high direct current at low voltage has been announced by the General Electric Co., Schenectady.

Applications include aluminum potlines and other users of large amounts of direct current. Four of the generators, each rated at 550,000 amperes, but only 45 volts, are already in service in the Air Force's "hot-shot" wind tunnel at Tullahoma, Tenn.

Needs No Brushes—Key to this spectacular performance is the use of a liquid-metal collector—a low melting point sodium-potassium eutectic—which serves in place of the standard commutator brushes of a generator.

Because the new machines generate dc without commutation, they are called acyclic—meaning noncyclic. By contrast, standard commutator-type machines generate ac and rectify it to dc by means of the commutator.

NaK Is the Key—Built by General Electric's Large Motor & Generator Dept. at Schenectady, a low-melting eutectic alloy of sodium and potassium (NaK) is used as the liquid collector.

The rotor is of solid steel integral with the shaft. Cylindrical stator poles and the frame surround the rotor. The NaK circulates between the rotating and stationary parts of the collector.

NaK has many properties making it ideal for high-current, low-voltage applications. It's a liquid from 10°-1400°F. It weighs less than water and has low viscosity. Thus, it can be used at high peripheral velocities without high viscous losses.

Wets and Welds—Another point is that it readily wets the collector surfaces at low temperatures. Thus, it essentially welds the rotating and stationary parts of the collector together with respect to current-carrying ability.

Because NaK oxidizes rapidly in air and reacts with water, the generators are enclosed and filled with pure dry nitrogen. A slight positive pressure and oil seals around the shaft insure the exclusion of oxygen or water vapor.

Many industries require high-current, low-voltage dc current, point out L. M. Harvey and W. C. Bachtel, GE engineers who played a significant part in developing the machine.

What Are Advantages? — The acyclic generator offers:

- High speed operation (3600 rpm), permitting use of economical prime movers;
- High continuous current capabilities (150,000 amperes);
- High efficiency (98 pct or higher);
- High peak current capability;
- Pure dc output, free of voltage ripple.

Simplicity of construction of the generator results in high reliability, low maintenance, and long life, Mr. Harvey said. There is little wear of internal parts; bearings and external auxiliaries need only normal attention.

DISCUSS COMMERCIAL USES: M. W. Johnson, general manager and L. H. Matthes, manager of marketing at GE's Large Motor & Generator Dept. lead development and commercial studies for the acyclic generator.

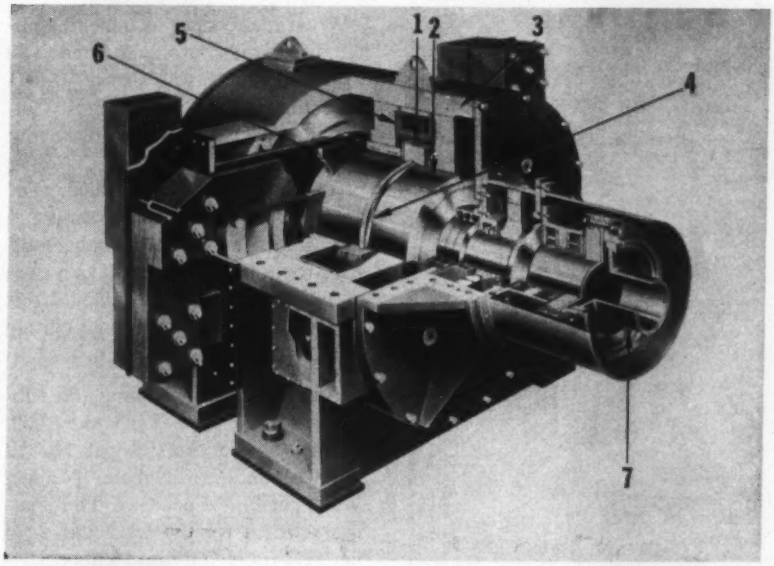
How It's Used—The acyclic generator can be driven by a turbine or a motor, directly or through a gear, singly or in tandem.

In electrolytic process applications, such as an aluminum potline, the requirements might be for 150,000 amperes at 400 volts. Six acyclic generators, each rated at 150,000 amperes, 67 volts, could be driven by a 60,000 kilowatt steam turbine. Voltage balance between generators is provided by rheostats in each generator field. A single motor-generator set and a common excitation bus serve the generator fields in parallel.

A typical chlorine-cell line rated at 150,000 amperes and 134 volts could be served by a two-unit set in series.

Other Applications—Power supply for particle accelerator magnets, and generators for pulse duty such as the "hot-shot" wind tunnel are other applications.

Acyclic generators are used in the wind tunnel at Tullahoma because of their very high peak-current capability. The machines have the very high energy, short time, peak-power generation that is needed for developing and testing components of the space-vehicle age.



KEY PARTS: Rotor is solid steel integral with the shaft. Cylindrical stator poles and the frame surround the rotor. A liquid metal circulates between the rotating and stationary parts of the collector. Key at right.

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*1. NaK Collector Shaft. 2. Rotor. 3. Stator. 4. Rotor Collector Ring. 5. Flexible Coupling. 6. Liquid-Cooled Bus Work. 7. Flexible Coupling.

New Coating Process Builds Sturdier Cutting Tools

Electrophoretic deposition may be the means by which ductile tool shanks can be equipped with superior cutting edges.

Early results are promising. Machining could benefit.

▪ Manufacturers of cutting tools have always been able to supply industry with right kind of tools for the job. The Space Age, however, has introduced a line of thermal-resistant alloys. Unfortunately, some of these alloys are virtually unmachinable with present tools.

A recent research project suggests a new approach to the problem. It is a new way to fabricate cutting tools. Carbide coatings are deposited on ductile tool shanks. Work was restricted to simple carbide formulations. The technique used is called electrophoretic deposition. The method is both practical and economical.

Promising Results — How do these tools compare in machinability with their commercial counterparts? Lathe tool inserts have been prepared which offer equal or longer life than commerically available solid tools.

A vital feature of these coated tools is the development of a well defined, hard diffusion zone between the substrate and the carbide coating. This diffusion zone is probably responsible for the excellent bonding achieved throughout the program.

Carbide-coated spade drills, ¼ in. diam, yielded a threefold increase in tool life over uncoated, Type T-15 cobalt HSS drills of the same geometry. Also, in the turning of AISI 4340 steel (quenched and tempered to 300 and 500 Bhn), the life of coated tools met and, in some cases, exceeded solid C-6 tool life.

Coatings Contain Boron

Composition of Carbide Coatings and Commercial Solid Tools

Carbide Coatings

Sample No.	Grade	WC	Co	TiC	NbC	TaC	B	Pressure, tsi	Temperature, °C	Time, minutes
		Percent by Weight						Hot Pressing Conditions		
2-3	C-2	94	5.5	—	—	—	0.5	½	1350	10
2-4	C-2							1	1350	10
2-5	C-2							1½	1350	10
2-6	C-2							2	1350	10
6-3	C-6	82	9.5	8	—	—	0.5	½	1350	10
6-6	C-6							1	1350	10
6-6	C-6							1½	1350	10
6-7	C-6							2	1350	10
67-1,2	C-5	74	10.5	8	1.5	5.5	0.5	2	1350	10
67-3,4	C-5							2	1350	20
67-5,6	C-5							2	1350	30

Commercial Solid Lathe Tools

Sample No.	Grade	WC	Co	TiC	NbC	TaC	B
A	C-2	94	6	—	—	—	—
B	C-6	82	10	8	—	—	—
C	C-6	72	8.5	8	—	11.5	—
D	C-2	90	6.5	—	—	3.5	—

The work was sponsored by the Manufacturing Technology Laboratory of the AFSC Aeronautical Systems Div. of the U. S. Air Force under Contract AF 33(600)-41436, ASD Project 7-868. The project was directed by Lt. Col. E. M. Morse.

Actual studies were performed by Vitro Laboratories, Div. of Vitro Corp. of America, W. Orange, N. J. Metcut Research Associates, Cincinnati, compiled the performance data.

Literature Search — The first phase of the project was a literature search. Here, the need for improved cutting tools was emphasized. An example was cited of an aircraft manufacturer who made a change in materials for spar and wing sections. Aluminum was replaced by AISI 4340 steel.

What happened to machinability? Feed rates dropped from 150 to 4 ipm. There was also a 40-to-1 reduction in production rates. Cutter life decreased, too, by about 96 pct.

The need was established. The second phase examined coating materials and substrate compositions. Electrophoretic deposition was another topic for study. Could this method be used to fabricate cutting tools?

Starting Point—Among the substrates tested were T-15 tool steel, Kovar (54 pct Fe, 28 pct Ni, 18 pct Co) and heavy metal (93 pct W, 5 pct Ni, 2 pct Cu). The coating selected for the tests was a 94 pct WC-6 pct Co alloy. This particular carbide has a sintering temperature of 1400°C.

Sintering had to be performed

How Long Do Coatings Stand Up?

Tool Life of Coated and Commercial Solid Lathe Tool Inserts (life in minutes at indicated cutting speed to 0.015-in. wearland)

Coated Inserts		AISI 4340 (300 Bhn)			AISI 4340 (500 Bhn)			AISI 1018 (170 Bhn)	Incoloy 901	A-286	
Sample No.	Grade	150 fpm	200 fpm	375 fpm	100 fpm	150 fpm	200 fpm	600 fpm	100 fpm	100 fpm	200 fpm
2-3	C-2	0'10"*	.....	.....	.....	.....	.....	0'50"*	.....	.....	.....
2-4	C-2	0'10"*	.....	.....	.....	.....	.....	0'15"*	.....	.....	.....
2-5	C-2	8'30"	.....	.....	.....	.....	.....	3'	.....	.....	.....
2-6	C-2	8'30"	.....	.....	.....	7'	.....	5'25"	.....	.....	.....
6-3	C-6	1'10"	.....	.....	.....	.....	.....	0'15"	.....	.....	.....
6-6	C-6	29'30"	.....	.....	40'30"	20'45"	6'30"	6'40"	.....	.....	.....
6-5	C-6	27'	19'	.....	.....	.....	.....	8'10"	.....	.....	.....
6-7	C-6	34'30"	.....	.....	.....	.....	.....	9'20"	.....	.....	.....
6-7 (on edge)	C-6	41'	.....	.....	.....	.....	.....	.....	.....	.....	.....
6-5	C-6	31'	.....	.....	.....	.....	.....	.....	.....	.....	.....
67-1	C-5	.....	41'13"	.....	.....	40'02"	.....	28'50"	.....	.....	.....
67-2	C-5	.....	.....	.....	.....	.....	10'45"	.....	12'20"	0'30"	.....
67-3	C-5	.....	35'12"	.....	.....	50'46"	.....	11'32"	.....	.....	.....
67-4	C-5	.....	.....	.....	.....	.....	.....	.....	8'01"	6'	.....
67-5	C-5	.....	5'52"*	.....	.....	.....	.....	14'30"	.....	.....	.....
67-6	C-5	.....	5'20"*	.....	.....	.....	.....	.....	2'	1'05"	.....

* Carbide coating chipped off

Comercial Inserts											
A	C-2	12'	1'30"	.....	20'	8'30"	.....	11'30"	18'	.....	12'
B	C-6	44'	.....	.....	42'30"	20'	4'45"	.....	.....	.....	.....
C	C-6	.....	32'30"	26'	.....	8'35"	1'30"	.....	6'	.....	.....
D	C-2	14'	.....	.....	26'	12'	.....	.....	16'	.....	10'

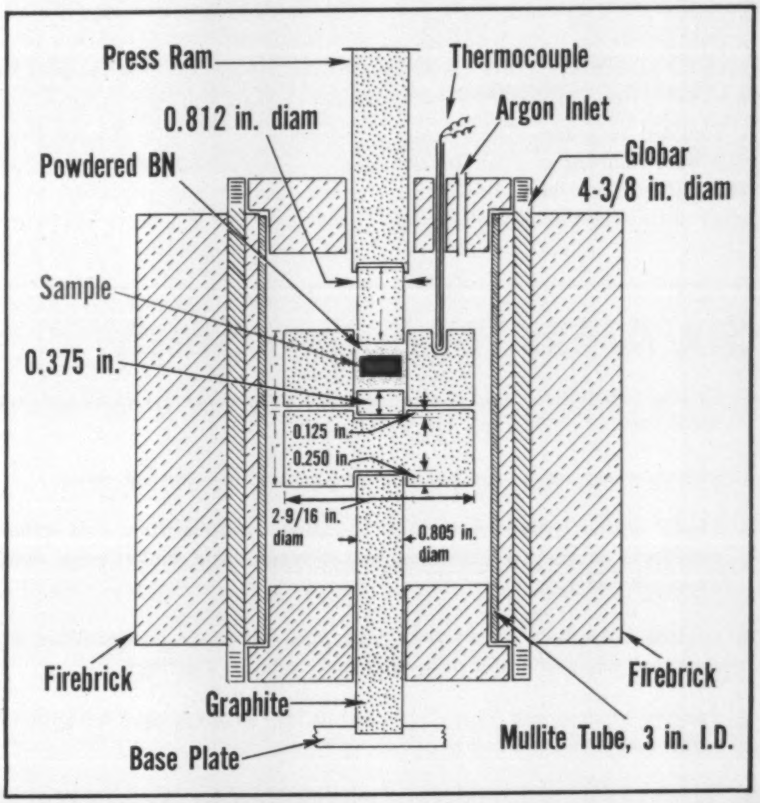
under 1350°C. Otherwise, the substrate would deform. Researchers decided to see if boron or silicon might retard the sintering temperature. This appeared to be the answer. How well would this coated machine tool, though?

Twelve specimens of solid lathe tool inserts were prepared. All were sintered. Four were boron-modified and four were silicon-modified specimens. The remainder were unmodified commercial inserts. The 12 specimens were finish ground to a standard size of 0.125 x 0.500 in., with a nose radius of 1/32 in.

Double Reward—This series of tests proved that a C-2 cutting tool could be modified by small amounts of boron to permit a lower sintering temperature. Boron was more successful than silicon. More important, however, the tests also proved that such a tool would still retain the cutting qualities of an unmodified commercial C-2 insert.

First deposits were made on T-15 tool steel substrates. These substrates were ¼ in. square and ⅛ in. thick. Dispersions were prepared from —325 mesh, 91.5 pct pure boron powder and a premixed 94

Setup Handles Hot Pressing



SPECIAL DESIGN: Lab-built hot pressing equipment increases coating density, lowers sintering temperature and retards grain growth.

Coatings Improve Spade Drills

Tool Life Test Results on Carbide-Coated and T-15 Cobalt HSS Spade Drills
(number of holes to indicated wearland)

Cutting Fluid: Active Cutting Oil
Feed: 0.001 ipr
Workpiece: AISI 4340 steel

Material Hardness	Cutting Speed, fpm	Depth of Hole, in.	Carbide-Coated Drills Grade	Carbide-Coated Drills Sample No.	Carbide-Coated Drills No. Holes	T-15 HSS Drill No. Holes	Wearland, in.
38 Rc	150	½	C-6	65–2	5	8	>0.016
38 Rc	150	½	C-6	65–4	3	—	—
50 Rc	70	½	C-6	65–3	12*	9	0.006
50 Rc	85	¼	C-6	65–5	25	15	0.012
50 Rc	100	¼	C-6	65–6	15	—	0.018
50 Rc	100	¼	C-6	65–6	30	—	point failure
50 Rc	100	¼	—	—	—	16	0.015
50 Rc	100	¼	C-6	65–7	25*	—	0.012
50 Rc	100	¼	C-5	66–1	50	—	0.014
50 Rc	100	¼	C-5	66–1	56	—	coating peeled
50 Rc	100	¼	C-5	66–2	60	—	0.012
50 Rc	100	¼	C-5	66–2	65	—	0.022

*** Small chip in coating at point; test stopped.**

WC-6 Co powder. Here's a rundown of the materials:

WC-Co powder	42.3 g
Boron powder	0.20 g
Zein protein	0.85 g
Isopropanol	575 cc
Nitromethane	275 cc
Cobalt	Trace

Tumbled in a Jar—These materials were tumbled in a jar for one hour. They were then added to a small circulating tank which served as the anode for the electrophoretic system. The substrate was suspended into the tank and a dc potential of 250 v was applied across the bath for two minutes. A 0.010-in. thick coating resulted.

Slight deformation was noted in the compact. Further studies revealed this was due to cementite and thermal expansion. At this point, Kovar was examined as a substrate. The engineers also turned to hot pressing to control thermal expansion. They built special hot-pressing equipment for this purpose.

Disks of Kovar were sintered in hydrogen for 15 minutes at 1300°-1350°C. After sintering, a WC-Co-B coating was electrophoretically deposited on the disks for three minutes at 250 v. The green coatings were isostatically pressed at 7.5 tsi. Sintering followed at 1250° and 1300°C for 15 and 30 minutes.

Functional Step—In hot pressing, the density of the carbide coatings can be increased without sacrificing sintering temperature and desirable grain size. This innovation yields marked reductions in heat-up, sintering and cooling times. There's less porosity and grain growth than you find in cold-pressed and sintered specimens.

In the final phase, the electrophoretic method handled more complex shapes. Spade drills were put to the test. After the machined samples were coated, they were hot pressed on the specially designed setup shown on the preceding page.

The best C-6 coated drills outlasted uncoated T-15 drills by about 60 pct. Material was AISI 4340 steel (50 Rc). Cutting speed was 85 fpm. The best C-5 coated drill was Sample 66-1. Its tool life was more than three times longer than the uncoated T-15 tool.

Why the Difference?—You will note that there is a difference between coatings of the same composition. This is due to differences in hardness and density. To obtain higher and more uniform densities, hot-pressing techniques must be improved.

The fact that cutting tools can be fabricated through the electrophoretic technique is progress in itself. This particular research program has already been extended. It will now refine this new method and apply it to other types of tools.

Studies are also under way to develop new coating-substrate combinations. These are the tools which may be able to soften the production barrier of high-strength refractory metal alloys.

Six Areas for Future Study

1. **Extend fabrication and testing program to other types of cutting tools such as mills, taps and twist drills.**
2. **Improve techniques for hot pressing of carbide-coated tools.**
3. **Study wider range of carbide coating compositions and other substrate materials including molybdenum and nickel-base low-expansion alloys.**
4. **Locate the effect of particle size and substrate composition on sintering behavior and adherence of carbide coatings.**
5. **Explore other areas where the coated tool process may be applied right away to increase production rates.**
6. **Develop new coating-substrate combinations for the machining of high-strength refractory metal alloys.**

New Breaker Curbs Power Arcing

Many of the modern metalworking processes call for extremely high electrical input.

Here's a circuit breaker with a new concept that insures complete high-voltage protection.

▪ A new high-current circuit recloser interrupts power arcs in a vacuum. Simply stated, it provides a high-vacuum environment which removes the arc products of circuit interruption.

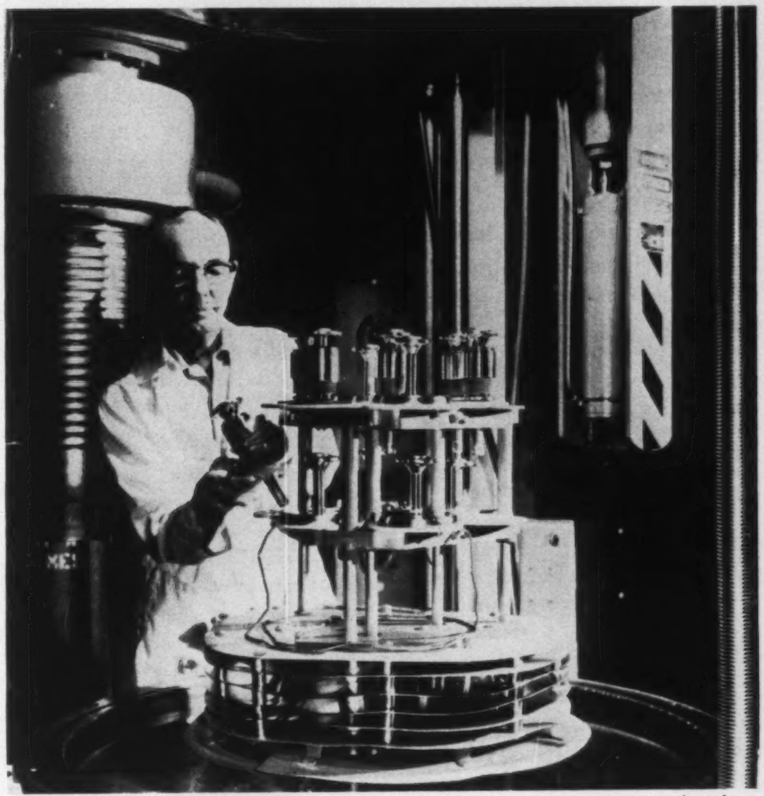
With a rated interrupting capacity of 8000 amp at 15.5 kv and 12,000 amp at 4.8 kv, the new vacuum recloser is available in a complete line of oilless high-speed circuit breakers.

The recloser's quick clearing time is less than two cycles. This includes fault sensing, tripping and circuit interruption. Its developer, General Electric Co.'s Switchgear and Control Div., Philadelphia, claims it's the fastest heavy-duty circuit recloser on the market.

Thorough Study—The vacuum interrupter in this recloser is the result of more than 30 years of research and development.

Dr. C. Guy Suits, GE's director of research, reports: "Four major breakthroughs were made in developing the breaker. First, suitably degassed materials were developed. Then, 'current chopping,' normally a factor with interruption in a vacuum, was solved. Next, 'non-welding' contact materials were produced. Finnally, interrupter shapes were designed to meet high dielectric strength and high currents."

Breaker Breakdown—The recloser's interrupter consists of a pair of metallic contacts. They produce arc rotation and a metal shield for metal-vapor condensation. A bellows permits the movement of one of the contacts through a ½-in. stroke. All parts are sealed in vacuum below one-billionth of atmospheric pressure.



READY TO BLAZE: The operator racks the interrupter contacts in place to prepare for the contact-to-bellows brazing operation.

Materials used in the contacts don't weld together or release a lot of gas molecules. Temperature during the split-second arcing may exceed 10,000°C.

Longer Life—Service life of the new breaker should be many times longer than that of any standard unit with the same rating. Tests to date prove inspection can be cut 75 pct.

Further, foundation costs will be reduced. Why? Because the high-speed recloser operates with little impact or ground shock. And the recloser is quiet during load switching and short-circuit operations.

The vacuum recloser's quick clearing time reduces the chance of line burn-down during sustained power faults, says company engineers.

They add, the breaker's inherent characteristics restrict the damaging effects of multiple lightning strokes.

Added Uses—Along with its use for short-circuit interruption, the recloser meets all switching functions encountered by breakers in its class.

Although not required by industry standards, it's well suited for capacitance bank switching. The breaker is insensitive, both to the size of the bank and to the inrush currents of back-to-back switching within its continuous current rating. The recloser is re-strike free. It doesn't produce over-voltages while de-energizing a capacitive load.

Columbium Alloys Extend Scope

Researchers Balance High- and Low-Temperature Properties

Researchers point out that columbium alloys will be called on for tomorrow's space ventures.

Metalworkers should be storing the facts on each alloy, with an eye toward future application.

- Scientists at Westinghouse Electric Corp.'s research laboratories, Pittsburgh, report the development of a new family of columbium alloys.

"Columbium is a key space-age material," Dr. S. W. Herwald, vice president-research, declares. "These new alloys show great promise as structural materials for future space vehicles."

Proper Balance—"The new family of columbium alloys exhibits the best balanced combination of properties yet achieved with this refractory metal," says Dr. Herwald. "High strength at high temperatures is attained without drastic loss in workability. Low temperature ductility is inherent with the pure metal itself."

"Both properties are crucial for space applications," he points out. "Without workability, the fabrication of a spacecraft would be difficult and costly. Without low-temperature ductility, the intense cold of outer space would render the structure brittle and unsafe."

Heads for Pilot Line—Three of the new alloys are in pilot production. They are called B-33, B-66 and B-77. First on the list is B-33, a columbium-vanadium alloy.

This alloy is characterized by a high degree of fabricability. It can be sheared at room temperature without edge cracking. Bend tests show that forming jobs such as spinning, drawing and brake forming can also be performed at room temperature. However, severe forming can be done more readily, a little above room temperature.

The material is easily welded. Preliminary welding data indicate that sound ductile welds can be made by tungsten inert gas (Tig) and metallic inert gas (Mig) methods. The weld metal remains ductile below —200°F.

Transfers Heat—One application now being considered for the B-33 alloy is in heat exchangers for spacecraft. The only means of getting rid of waste heat in space is by radiating it away at high temperatures.

When unfolded in space, such an exchanger might be as large as a football field. Only a strong, light, high-temperature metal would be feasible.

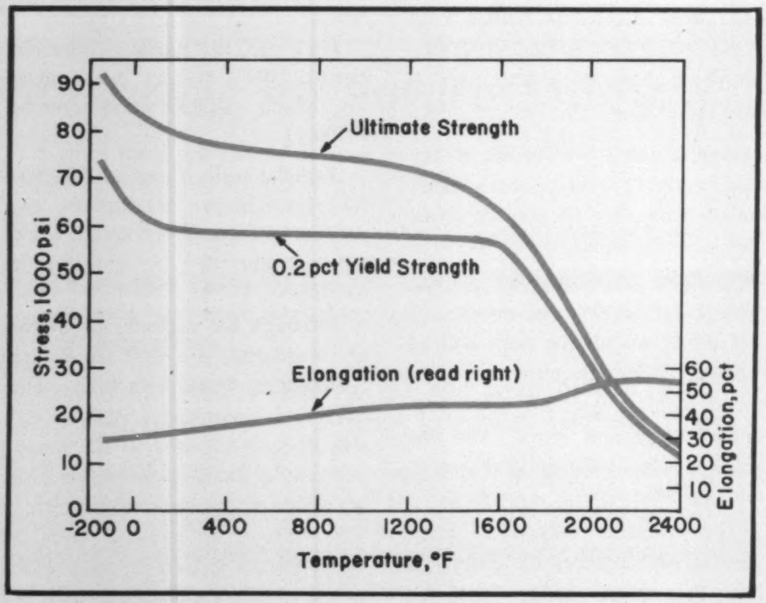
The new columbium alloy resists corrosion. The alloy's tendency is not to absorb neutrons. This makes it a logical candidate for components in nuclear-fired spacecraft.

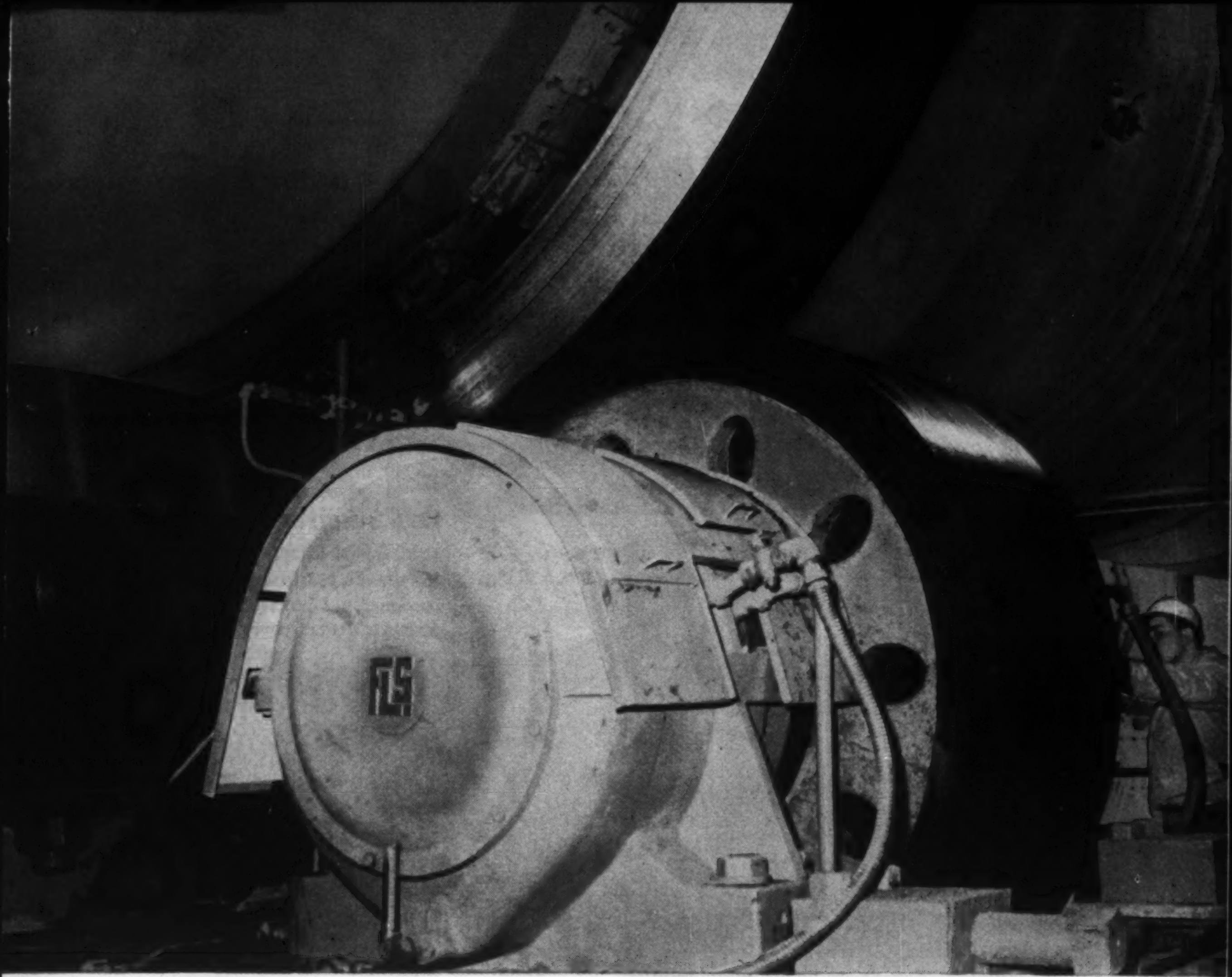
Holds its Strength — The alloy does not rely on strain hardening to gain optimum properties at high temperatures. At 2000°F the tensile properties of cold-rolled and stress-relieved material are almost identical to those of fully recrystallized material. After one hour at 2200°F, 90-pct cold-rolled alloy is fully recrystallized.

Arc-melted ingots, billet extrusions, bar and sheet are commercially available along with development quantities of foil, wire and tubing.

The two other columbium alloys, (B-66, B-77) will take their turn next in the pilot system. The first (B-66) is a columbium, vanadium, molybdenum, zirconium alloy. The latter (B-77) uses tungsten in place of molybdenum.

What Happens at 2000°F?





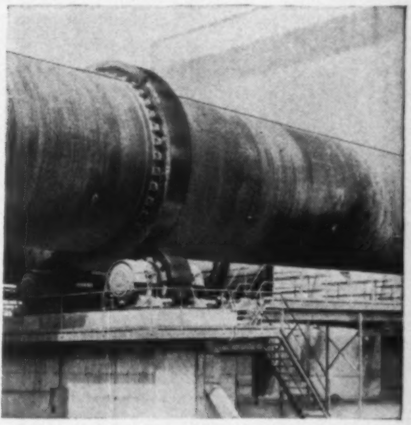
HOW BIG IS A MAN... against 89 tons of cast steel?

These mammoth 89 ton steel tire, kiln supporting and thrust roller assemblies were cast in the foundries of Erie Forge & Steel Corporation. They bear the weight and facilitate the operation of the largest rotary cement kilns in America. The distance between the tire and roller assemblies on each rotary kiln is 100 feet. Cast steel tires are over 20 feet in diameter, weigh 60 tons each. Thrust rollers weigh 6¼ tons each and kiln supporting rollers 22½ tons each.

Each of these two giant kilns produces over 8000 barrels of cement daily with ease in the Dundee Cement Company plant at Dundee, Michigan

By comparative size the man is small—but men made these steel behemoths and men run them. The men of Erie Forge & Steel Corporation welcome the challenge to furnish steel castings and forgings, from pounds to tons, for the diverse machines of industry.

Submit your cast or forged steel component requirements to us with full confidence.



Photographs are by courtesy of F. L. Smidth & Company, designers and builders of "The Largest Rotary Cement Kilns in America."

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NEW PATENTS

Bans Refining Fumes

Fume suppression during refining molten ferrous material, K. H. Sargent (assigned to The British Oxygen Co. Ltd., London, England), Sept. 26, 1961. In a process for suppressing fumes during the oxygen refining of molten iron, a combustible gas is added to the blowing gas. Excessive cooling of the melt is avoided. Canadian 628,162.

Ore Smelting

Method and apparatus for smelting titaniferous iron ore, T. F. Reed (assigned to U. S. Steel Corp.), Sept. 5, 1961. Patent covers an improved technique for smelting titaniferous iron ores in a blast furnace. Object is to recover a low-titanium pig iron product. Slag flushing practice is changed. Canadian 627,035.

High-Temp Steel

High-temperature, wear-resisting steels, B. L. Johnson, Jr. (assigned to Latrobe Steel Co.), Sept. 19, 1961. A steel for making bearings, gears, and other articles exposed to high temperatures in corrosive atmospheres consists preferably of about 1.1 pct C, up to 0.3 pct Si, 0.5 pct Mn, 14.5 pct Cr, 1 pct V, 4.25 pct Mo, not over 0.025 pct each of S and P, and the remainder essentially all Fe. Canadian 627,850.

Weldable Alloys

High-temperature weldable alloys, R. S. Zeno and R. F. Gill (assigned to General Electric Co.), Oct. 10, 1961. An alloy suitable for making piping or other articles resistant to steam corrosion comprises 0.1-0.2 pct C, 0.75-3 pct Cr, 0.75-1.75 pct Mo, 0.3-1 pct V, 0.3-0.8 pct Mn, 0.28-0.5 pct Si, and the balance essentially all Fe. U. S. 3,003,868.

Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.

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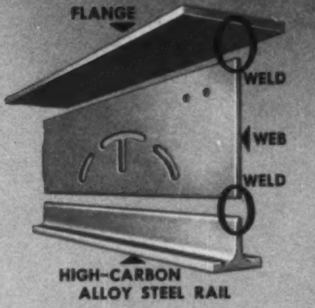
TARCA TRACK

A TRULY SUPERIOR OVERHEAD MATERIALS HANDLING TRACK



Integrally Welded

Automatic welding machinery especially developed for Tarca Track fabrication assures reliable welds. Top flange, web, and high-carbon steel rail are joined by continuous welds to form a one-piece dependable unit.

Tarca Track—an outstanding, new Cleveland Tramrail development. Different from all other overhead materials handling tracks. Result of years of extensive research and testing.

Tarca Tracks are straight and accurate. Not subject to distortions and broad dimensional variations of ordinary tracks fabricated from standard mill beams.

Tarca wearing rails are hard. Made of high-carbon alloy steel integrally welded into a composite track section.

Tarca running treads are flat, raised, smooth. Enable easiest load movement —provide extra wear—prevent peening.

Tarca Tracks have great rigidity because all welds are continuous.

Tarca Tracks are faster, easier to erect. Greater track accuracy simplifies installation. New support fittings save erection time—facilitate track leveling —provide flexibility to relieve stresses from alignment variations.

Ten Standard Sizes—Tarca Tracks range from 8 to 20 inches in depth. Special sizes can be made to suit unusual requirements. Track parts easily proportioned to provide balanced design for any load condition.

Ask for this helpful booklet—No. 2032

Covers all major features the buyer should know about overhead materials handling equipment. Has complete story on Tarca Track. Contains detailed equipment specifications and handy proposal evaluation form.

A GUIDE
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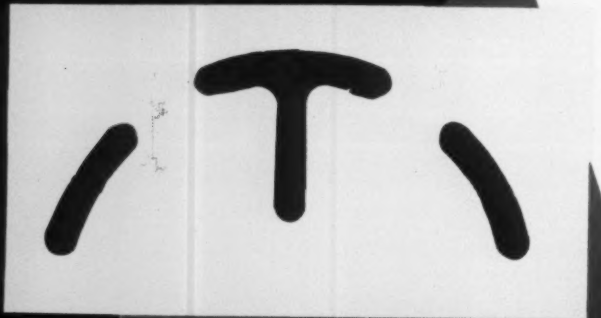
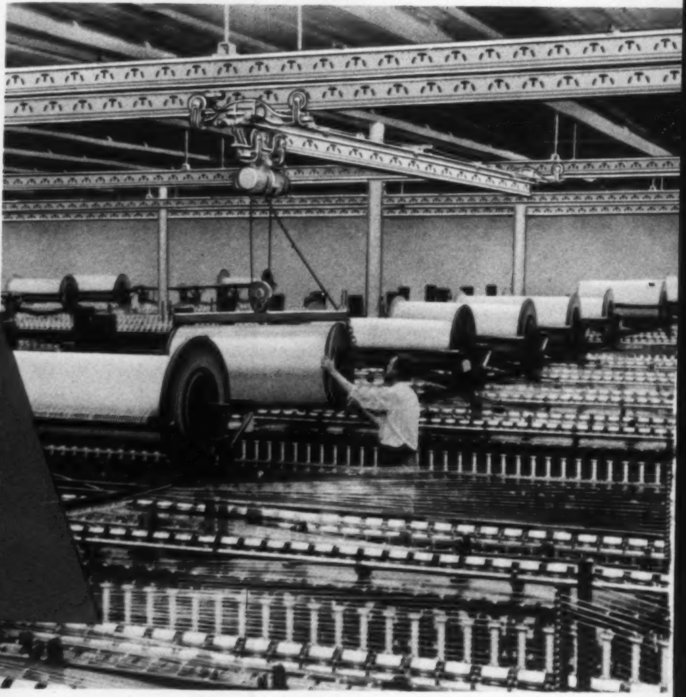
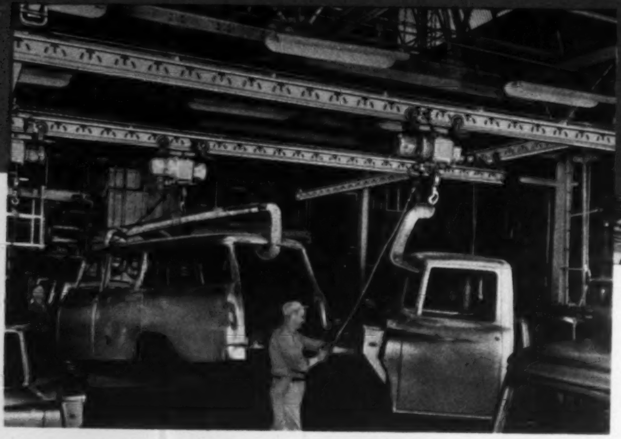


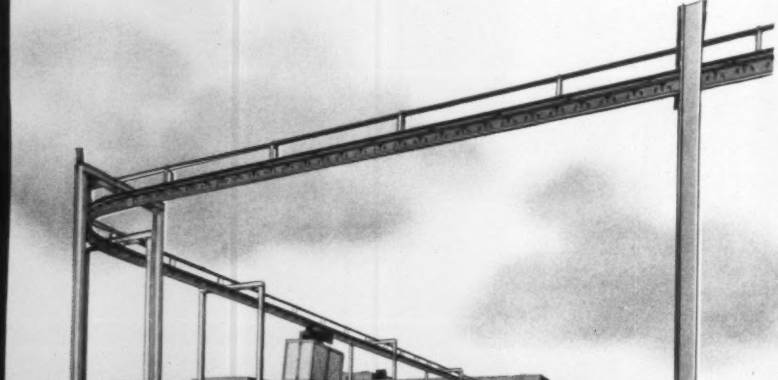
Trade mark of durability and strength —punched into all Tarca Tracks.



Many hundreds of textile mills have depended for decades upon Cleveland Tramrail for a great part of their materials handling equipment. Illustrated is a Tarca Track crane system handling twister beams.



Nearly all of the great American and Canadian automotive plants have installations of Cleveland Tramrail. Many include thousands of feet of track and hundreds of cranes.



Cleveland Tramrail is a leader in automatic materials handling. A great variety of installations are in service. They operate between two or more points on the same or different elevations, or between buildings, as illustrated. One system serves 126 stations.

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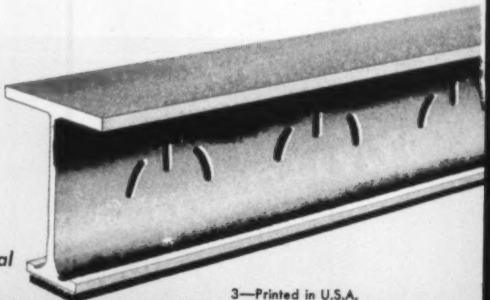

FREE TECHNICAL LITERATURE

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

For Heat Treating

"Fluidized Beds," four pages, is a completely-revised publication describing a line of this equipment. Cutaway drawings with callouts explain construction features. Ratings, dimensions and performance data are also shown, along with an over-all system diagram and catalog number listing. (General Electric Co.)

For free copy circle No. 1 on postcard

Production Facilities

In 12 pages, a new brochure describes specialized production facilities now available to manufacturers. It tells about welding, machining, assembly, engineering, and other facilities which have been utilized by the Atomic Energy Commission, Naval Ordnance Laboratory and NASA as well as several other industries, large and small. (Danly Machine Specialties, Inc.)

For free copy circle No. 2 on postcard

Mist-Style Coolant

An analysis brochure cites the advantages of using a mist-style coolant system on industrial machines. Mist cooling supplies the coolant in an atomized form that can realistically increase die, cutter, drill and tap life. (Ash & Co.)

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Plastics and Fibers

Info in a new eight-page, two-color catalog is useful in selecting and applying laminated plastics and vulcanized fibers in electrical, electronic and mechanical applications. The first two pages of text describe in general terms five different types of these materials. Latter pages delve into more specific details. (Taylor Fibre Co.)

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Jig Conversion Chart

Designed to expedite the ordering of drill-jig bushings, a new conversion chart should be a valuable aid for fixture designers. It converts symbol numbers for easy, accurate ordering of drill bushings. It also lists ASA standard-symbol numbers. (Acme Industrial Co.)

For free copy circle No. 5 on postcard

Quiet Please

"The Why and How of Noise Control" discusses fundamentals of industrial-noise control. This new 16-page booklet shows how to set up a noise control program and how to achieve safe and efficient working conditions. The equipment needed for this kind of program is also discussed. (H. H. Scott, Inc.)

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Meter-Relay Data

The complete story of locking contact meter-relays, including operating features and standard circuits for achieving the most popular types of control action, is contained in a new bulletin. The literature also covers isolated coils, double-locking coils, response time and damping, overload protection and control components used with meter-relays. To facilitate ordering, all specs are included, such as dimensions, sensitivities, case styles, and prices. (Assembly Products, Inc.)

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Tough Tool Steel

One producer of carbon, low-alloy and stainless-steel castings announces publication of a technical data sheet on a new grade of tool

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If you want more details on products advertised in this issue fill in below:

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Name ....

Title ....

Product Manufactured ....

Company ....

Co. Address ....

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City .... Zone .... State ....

steel. The metal is a tough, oil-hardening tool steel suitable for general-purpose use. Also included is specific information on hardening, annealing, tempering and hardness. (Dodge Steel Co.)

For free copy circle No. 8 on postcard

Aluminum Grilles

This data and specification manual deals with a decorative aluminum grille product that's available in a wide range of standard and custom geometric patterns. The manual gives complete product specs, plus fully-detailed technical drawings of the various patterns. (Klemp Corp.)

For free copy circle No. 9 on postcard

Electrohydraulic Pumps

Here's a new bulletin that introduces a complete line of electrohydraulic, servo-controlled pumps and system components. How the pumps and components work, what functions they perform, and where they are applied are described in detail. (The Oilgear Co.)

For free copy circle No. 10 on postcard

About Polybutene

Polybutene characteristics and present and potential uses of this highly versatile petrochemical product are reviewed comprehensively in a new 31-page technical brochure. (California Chemical Co., Oronite Div.)

For free copy circle No. 11 on postcard

All-Electric Cranes

A new, two-color, 12-page bulletin contains numerous photographs, illustrations and technical information about a complete line of full-revolving, all-electric cranes. It describes over nine different crane models ranging in capacity from 150-16,250 tons. In addition, it points out many of the advantages to be gained through their application. (R. G. LeTourneau, Inc.)

For free copy circle No. 12 on postcard

Field Fabrication

Here's a new 36-page brochure on fabrication and field erection services. The illustrated booklet gives a behind-the-scenes picture of the wide scope of machinery, tools, materials, methods and quality-control procedures used in the fabrication of tanks, pressure vessels and other plate-fabricated equipment. Also included are detailed corrosion data charts, showing the corrosive effects of almost 400 salts, acids and other materials on 16 different types of metals and alloys. (Nooter Corp.)

For free copy circle No. 13 on postcard

Liquid-Level Gages

Featuring 168 view gages—all carried in stock—a new catalog covers a complete range of liquid-level devices for use on gear cases, machine tools, oil reservoirs, hydraulic systems, pumps, filling machines, tanks and bins. (Gitz Bros. Mfg. Co.)

For free copy circle No. 14 on postcard

Specs for Steel Joists

Newly-revised Standard Specifications and Load Tables for high-strength, open-web steel joists have just been released by the Steel Joist Institute. With the new specs, architects and engineers can now design open-web steel joists that are completely compatible with structural-steel specifications and design. Obsoleting all earlier editions, the new 52-page manual contains standard specifications and load tables for three types of joists.

For free copy circle No. 15 on postcard

Blast-Furnace Linings

A four-page illustrated bulletin on carbon brick, grade NMA, for blast furnace linings is now available. It lists some advantages of conventional carbon brick—thermal conductivity up to seven times that of ceramics, excellent dimentional stability up to 5000°F., and constant heat-transfer rate. Also, a large cut-away drawing of a typical blast furnace shows the recommended use of grade NMA brick in both bosh and hearth wall, as well as the associated use of large, machined carbon blocks for the furnace bottom. (National Carbon Co., a div. of Union Carbide Corp.)

For free copy circle No. 16 on postcard

Industrial Gas Info

In 48 pages, a new pocket-sized booklet provides industrial gas data in a compact, readily accessible form. Bound in leatherette for durability, the booklet lists physical and chemical properties of oxygen, nitrogen, argon, helium, hydrogen, carbon dioxide, acetylene, neon, krypton and xenon. (Air Reduction Sales Co.)

For free copy circle No. 17 on postcard

Quality in Ascendancy

The superiority of the vast number of products that are — and can be made from Roebling Cold Rolled Flat Spring Steel is a fact known throughout all industry.

You pay for mechanical and dimensional uniformity when you buy flat spring steel . . . you get it when you buy Roebling.

For information on how our products can help yours, write Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

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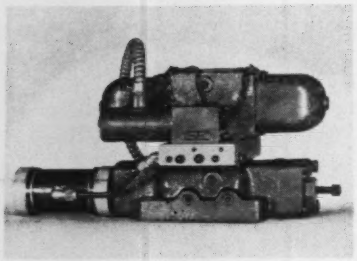
Roebling . . . Your Product is Better for it

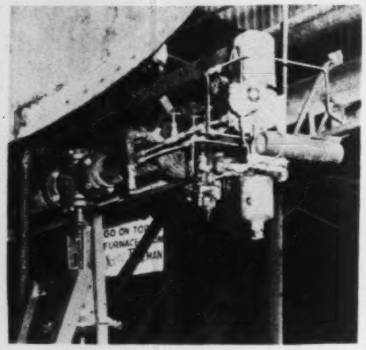
New Materials and Components



Four-Way Valve Controls Hydraulic Acceleration

Appropriately named the De-accelatrol Valve, a new unit controls acceleration and/or deceleration of hydraulic cylinders or drives. As an added feature, there's final creep for accurate positioning. This is done without any extra piping. All that's needed is simple electric switching. Operational controls are as follows: Start; adjustable low speed; adjustable acceleration; variable high speed; adjustable deceleration; and stop from low speed for positioning ease and high accuracy. (Pearne & Lacy Machine Co., Inc.)

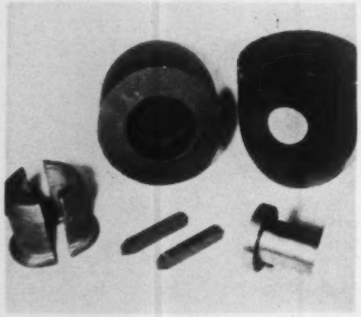
For more data circle No. 18 on postcard, p. 91



Sensing Cell Controls Blast Furnace Injection

With the injection of gas, fuel oil and oxygen becoming widespread practice among blast furnace operators, the metering of these fluids into the blast stream gains new importance. Here's a cell transmitter that offers several advantages in the measurement of these flows. This instrument, with its twin-diaphragm capsule and force-balance measuring system, is highly accurate. What's more important, it responds to flow changes instantaneously. Connected across an orifice plate in the injection line, it senses differential pressure and transmits a pneumatic output to the flow controller. This controller, preset to the desired injection flow rate, throttles a valve in the supply header. (The Foxboro Co.)

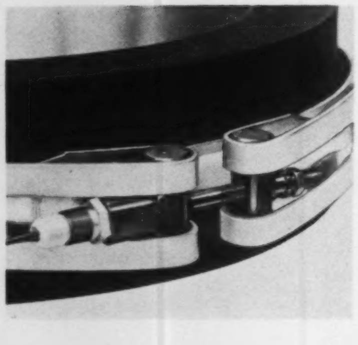
For more data circle No. 19 on postcard, p. 91



Solid Nose Stoppers Are Boon to Steelmakers

Two new types of solid nose stoppers have recently been developed for the steel industry. Both have been thoroughly tested and are now being used by a number of steel plants and casting shops across the country. Each unit is assembled in three steps. Components of the Key-Lock type include the stopper, steel inserts and ceramic spreaders. The T-Rod unit has graphite inserts. Both do away with an insert that slides over the rod stopper. Neither is held together with cement. Instead, the stopper is self locking on the rod. Also, the nose is tailored to the nozzle seat and engineered to mate properly with the rod. (Joseph Dixon Crucible Co.)

For more data circle No. 20 on postcard, p. 91



Clamp Separator Has Unusual Operating Principle

This new clamp separator represents an unusual approach to fastening and release problems. Designed to function as a fastener until commanded to separate, the unit differs from conventional assemblies in that the separation impulse is sent to the clamp itself as part of the separating sequence. In other words, the newcomer does not rely on the additional assemblies of the guillotine type nor on the "brute force" of an explosive release system. Instead, gas pressure formed by detonation of a small powder charge acts on a piston which ejects a trunnion bolt. This bolt transmits separation energy directly to the clamp. (Hi-Shear Corp.)

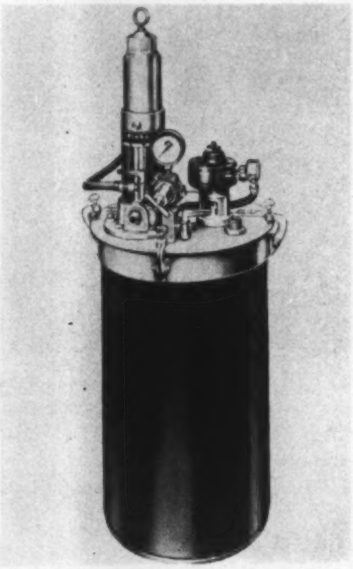
For more data circle No. 21 on postcard, p. 91

Automotive-Type Engine

A new automotive-type light weight, air cooled multifuel engine that starts unaided at temperatures as cold as −25° F was revealed recently by Ordnance Corps., U. S. Army. The engine runs on a variety of fuels including diesel fuel, low grade gasoline, compression ignition fuel and jet engine fuel. A four cylinder model is currently undergoing cold room tests. An eight cylinder model is also under development. (Lycoming Div., Avco Corp.)

For more data circle No. 22 on postcard, p. 91

Medium-Size Pump



This high volume pump in the "Pogo" series has just been made and designed for use as a principal source of material supply in small and medium size circulating systems. It can be used in non-circulating paint systems as well. The new Pogo Hi-Volume is an air operated pump with a 2:1 ratio. Recommended delivery for continuous duty is 3 gpm, with maximum delivery rated at 5 gpm. Air consumption is 2 cfm per gallon. (Binks Mfg. Co.)

For more data circle No. 23 on postcard, p. 91

Air-Release Valve

A new, inexpensive air-release valve vents air from hot water heating and chilled water cooling systems. Designated No. 69, it is a highly efficient, low cost vent to eliminate air and gases from pipelines in applications up to 100 lb operating pressure. This valve is sturdily constructed to provide years of maintenance-free, leak-proof service. Body is cast iron, valve and seat and float are made of corrosion-resistant stainless steel. Installed at the highest point in liquid systems, the valve automatically and continuously releases air as fast as it accumulates in the lines. (V. D. Anderson Co.)

A
ANDERSON
CLEVELAND
OHIO

For more data circle No. 24 on postcard, p. 91

Modular In-Line Switch

This modeular in-line switch comes in back-mounted assemblies, as well as in the standard front-mounted configuration. Back-mounted installations require a panel cut-out only ⅞-in. high and ½-in. wide for each module. The digital dial setting converts directly to electrical outputs corresponding to computer codes, with more than a dozen codes now available as

THE FREEDOM DiMENSION

. . . is shape flexibility

The investment casting process allows a new *freedom of design* . . . in shape . . . in materials. You can now design for function—the way you want the part!

This functionally designed instrument chassis was poured as an investment casting without design compromise. Dozens of expensive and complicated machining operations would otherwise have been required. Check your design with Hitchiner—in many cases you can buy *just what you want.*

Write for complete technical and facilities information.

HITCHINER
Milford 1, New Hampshire

STEEL "LEFTOVERS"
ARE HARD TO EAT UP
. . . yet eat up profits

Steel "leftovers" pile up because you bought in quantity to get a better price and hoped you'd find uses for them . . . or you ordered in quantity for a job which cancelled out half-way through.

How can you avoid "leftover" steel? And its profit-gobbling cost of possession?

Reduce or even eliminate your own inventory . . . let your convenient steel service center carry the inventory. It delivers exactly what you want, just when you want it, unloaded closest to your machines that will use it. Service center also can provide cost-cutting preliminary processing of steel for you . . . shearing, cutting, edging, burning.

Perhaps your accounting and production people don't realize the real *cost of possession* of steel in your inventory? If not, ask your steel service center for the fact-filled booklet, *What's Your Real Cost of Possession for Steel?* Or write us for a copy.

COST OF POSSESSION . . . ***to determine your own cost of possession for steel in inventory, consider all these factors:***

Cost of capital: inventory, space, equipment — Cost of operation: space, material handling, cutting and burning, scrap and wastage — Other costs: obsolescence, insurance, taxes, accounting

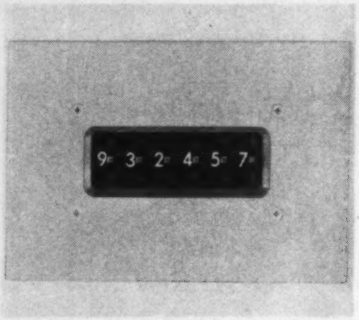
YOUR STEEL SERVICE CENTER
STEEL SERVICE CENTER INSTITUTE
540-D Terminal Tower • Cleveland 13, Ohio

Convenient to every steel user, steel service centers are customer-oriented, technically competent, fully equipped for fast delivery of steel in any type, form, and quantity.

Steel

STEEL SERVICE CENTER INSTITUTE

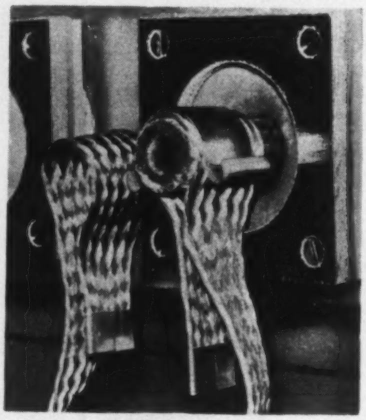
standard. Standard setting wheels provide 8, 10, or 12 dial positions. Special features include internal lighting, spacer modules, special dials and special codes. (The Digitran Co.)



For more data circle No. 25 on postcard, p. 91

Seals Electric Furnaces

This new terminal seal for high temperature electric furnaces was developed to replace the box-type enclosures which ordinarily are used over the ends of the heating elements. Elimination of the box-type enclosure helps to reduce the furnace shell temperature and simplifies maintenance. Flexible gaskets, which fit snugly around the heating elements, make the new seal leakproof. A wire screen guard prevents contact with the terminals. (Hevi-Duty Electric Co.)

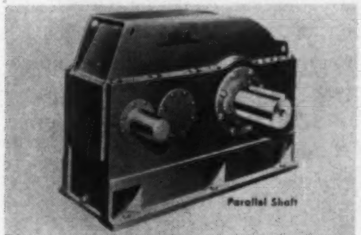


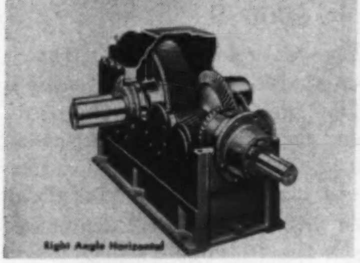
For more data circle No. 26 on postcard, p. 91

Speed Reducers

New from cover to base, helical-gear horizontal speed reducers are available in 22 standard sizes for both the parallel-shaft and right-angle types. Parallel shaft (Type Y) has ratios 1.84 thru 292 : 1, and right angle (Type YB) has ratios 5.06 thru 1207 : 1. Capacity ranges from 9000 to 1,570,000 lb-in. torque, in catalogued, standard units. Gears are single helical with precision cut extra-depth high pressure-angle tooth form for greater capacity and increased strength. Heavy duty double ended shafts can be turned 180° for double gear life, and have large diameters to accommodate maximum torque and overhung loads. (The Falk Corp.)

For more data circle No. 27 on postcard, p. 91

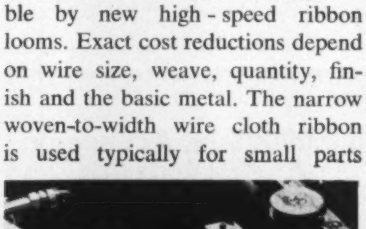


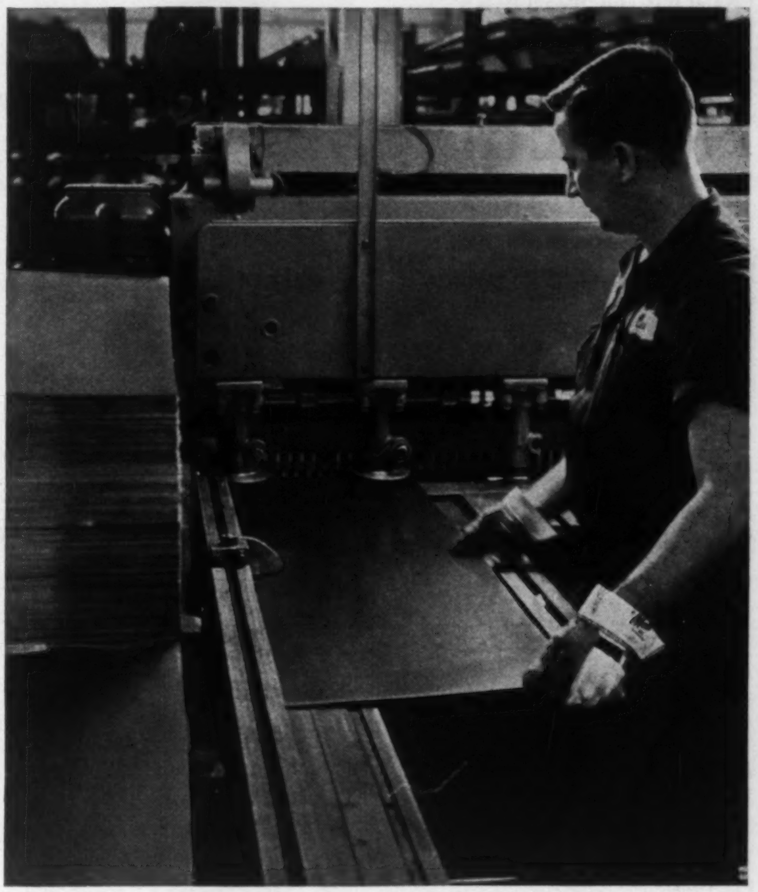


Woven-Wire Cloth

One company announced that it can now make narrow woven-to-width wire cloth at a low cost to the user. The economy is made possible by new high-speed ribbon looms. Exact cost reductions depend on wire size, weave, quantity, finish and the basic metal. The narrow woven-to-width wire cloth ribbon is used typically for small parts where a selvage or safe edge is required on both sides. (Reynolds Div., National-Standard Co.)

For more data circle No. 28 on postcard, p. 91





CUSTOMER-ORIENTED SERVICES

. . . problem-solving benefit offered by your steel service center

Have you ever considered how many ways your steel service center can help a business like yours? Their operations are customer-oriented . . . they have plenty of experience with metal fabrication processes, joining methods, layout and design problems and machine-tool scheduling. Chances are, metallurgical know-how available from the steel service center will be helpful to you, too.

The metalworking-minded salesman and the experienced people who back him up at the steel service center can be mighty helpful to you, whether you're "small business" or in FORTUNE'S Top 500. Pre-delivery fabricating services from steel service centers are cost-cutting-helpful, too . . . slitting, burning, bending, sawing, edging, and leveling.

Use the steel service center's counsel and facilities, as well as their ability to cut your *cost of possession* of steel . . . painless way to improve your profit picture and your product.

YOUR STEEL SERVICE CENTER

STEEL SERVICE CENTER INSTITUTE
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Convenient to every steel user, steel service centers are customer-oriented, technically competent, fully equipped for fast delivery of steel in any type, form, and quantity.

Steel

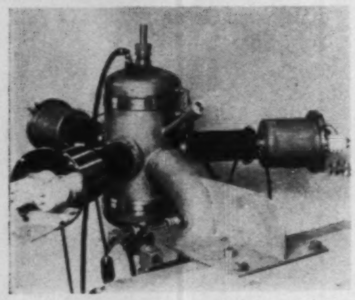
STEEL SERVICE CENTER INSTITUTE

New Equipment and Machinery

Unit Adds Pattern Rolling to Cut-to-Length Line

By the addition of an inexpensive accessory to a new roller level and cut-to-length line, steel or aluminum sheets can be pattern and edge rolled. This pattern rolling equipment consists of two or four hardened steel rolls with a capacity for 0.020-in. mild steel or 0.040-in. half-hard aluminum. Maximum sheet width is either 48 in., or 60 in., depending on the equipment model. Travel rate is 40 fpm. The basic line itself requires 10 x 40 ft of floorspace, while the pattern rolling attachment takes just 6 x 10 ft more. According to the manufacturer, this equipment package is available at a remarkably low price. (Huron, Inc.)

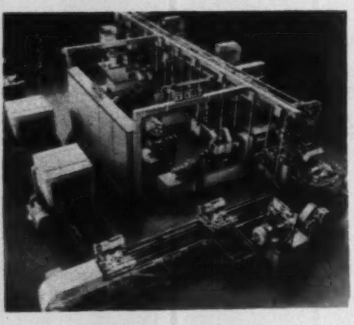
For more data circle No. 50 on postcard, p. 91



Electron-Beam Furnaces Hold 6000°F

Until the introduction of this new line of electron-beam furnaces, practical high-temperature furnaces were limited to about 4500°F. The newcomers boost this limit to better than 6000°F. Adaptable to any standard tensile-testing machine, the new furnaces uniformly heat specimens and hold ultra-high temperatures for prolonged periods. There's no need for heat shields. The basic unit provides continuous control and temperature profile regulation from 2000°-6000°F. Optional extras include temperature feedback circuits and optical extensometer systems. (Electron Heating Corp.)

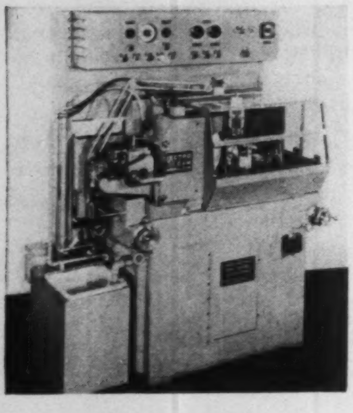
For more data circle No. 51 on postcard, p. 91



Transfer Machine Boosts Auto Component Output

A closed-loop, pallet-type transfer machine, 46-ft long by 20-ft wide, has recently been built to speed the machining of aluminum automobile-transmission extensions. During each cycle, the extensions are rough, semifinish and finish bored, counterbored, faced, drilled, reamed and tapped. The transfer machine also assembles the plain bearing automatically. A total of 18 pallets indexes at each cycle. Two parts clamp in each pallet. These pallets are designed to handle a load and reload operation that turns out a gross production of 124 parts per hour. (Ex-Cell-O Corp.)

For more data circle No. 52 on postcard, p. 91



Machine Grinds Bearings to 0.00005-in. Accuracy

Tolerances closer that 50-millionths of an in. are "old hat" with a new bearing grinding machine. It has already achieved this accuracy in grinding flange-type outer bearing rings. At the same time, the grinder precisely controls the geometry of the outer flange race and achieves refined surface finishes. Simplicity is one of the unit's major advantages. Basic building-block design makes it adaptable to a variety of jobs. Standardized tooling lets you use more than one part size. The result is lower tooling costs. The manufacturer sums it up like this: "Savings in tooling alone can amount to as much as the base price of the machine itself." With its great accuracy, the new machine should be a natural for the manufacture of space-age components. (Van Norman Machine Co.)

For more data circle No. 53 on postcard, p. 91

Entire girth weld on this Thiokol motor housing is x-rayed in one exposure.

For Thiokol's Redstone Division...

the metal parts countdown starts here

Right in the first stages of missile-motor processing, the Thiokol Chemical Corporation begins its countdown with a check—by radiography—of the soundness of each weld.

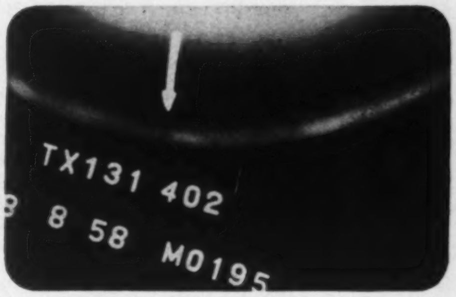
Putting power plants together for the nation's space program is intricate work.

So—Thiokol's inspection of metal parts begins with the welds because any seam weakness might well let the bird fly apart.

Also—if the motor uses a solid propellant, radiography provides Thiokol with a quick, sure way to examine the charge for unseen fissures or bubbles that could cause uneven burning and erratic runs.

There are many *ways* to use radiography, but the *reasons* remain the same. Radiography saves time and money. It assures a reliable product. You needn't be a missileman to appreciate these advantages.

If you feel your product can benefit from radiography, talk to an x-ray equipment dealer or write us for a Kodak Technical Representative to call.



Arrow points to faulty weld caught on Kodak Industrial X-ray Film.

Now . . . Ready Pack in ROLLS and SHEETS Kodak Industrial X-ray Film, Types AA and M in 200-ft. rolls (16mm, 35mm, 70mm) and sheets (8 x 10, 10 x 12, 11 x 14, 14 x 17).

- No darkroom loading—film sealed in a light-tight envelope.
- Just place Ready Pack in position and expose.
- Film protected from dust, dirt, light and moisture.
- In the darkroom—remove film from envelope and process.

Kodak

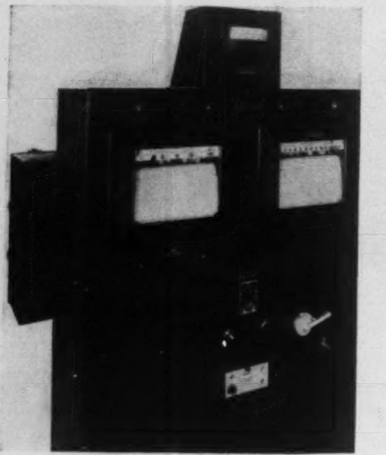
EASTMAN KODAK COMPANY

X-ray Sales Division Rochester 4, N.Y.

NEW EQUIPMENT

Heat-Treating Control

Precision control plus safety marks this new vacuum detection device. Called the Vacutronik, this versatile instrument indicates, records, and controls vacuum pressure during a heat-treating cycle. It's now the standard gage on all Ipsen vacuum units, replacing a former two-gage system. However, the Vacutronik may be used with any commercial vacuum furnace. It features a calibrated chart for recording pressures in the range from 0.1 micron Hg to atmospheric pressure. Distinguished also by its singular safety provision, the device effects a complete shutoff of the furnace heating elements, should vessel pressure exceed the preset level. (Ipsen Industries, Inc.)



For more data circle No. 54 on postcard, p. 91

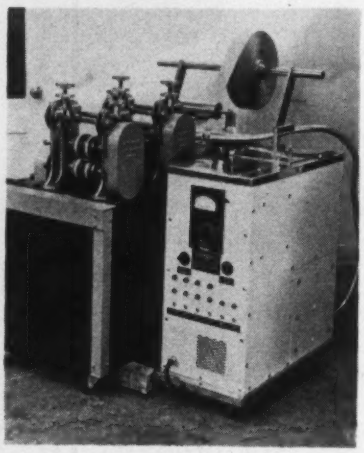
Ink Resists Heat

A new type of heat-resisting ink, designed specifically for making identification marks on steel, copper and brass and on welding rods, withstands temperatures up to 2500°F. Thus, it can be used to mark metals slated for heat treating. Identification marks on welding rods insure the proper weld for a specific type of steel. The color is used at the end of the rod, and specification numbers can be applied on the full length of the rod. The new ink can be brushed, sprayed and even printed. A special offset process is used for the latter purpose. (F. G. Okie, Inc.)

For more data circle No. 55 on postcard, p. 91

Bonds Thin Wraps

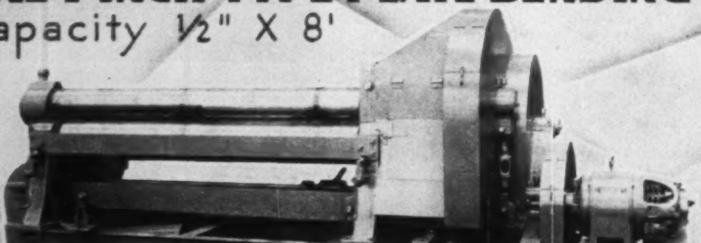
This versatile and economical extruder has a wide range of applications. It will instantaneously bond Mylar, Polyethylene, Cellophane, Foil and Saran to themselves, to paper, and to each other. In addition, it will handle all forms of hot-melt adhesives including rope, pellet, lump and granulated. Depending on the film, this extruder will apply hot-melt adhesives at speeds from 200-1000 fpm. A self-contained, portable unit, the extruder operates on a standard 110-v connection. It's heated up and ready to go in a maximum period of 1 hour. Also, the machine can be stocked, disconnected, moved to another location, hooked up and ready to run again in just 15 minutes. (Stein, Hall & Co.)



For more data circle No. 56 on postcard, p. 91

Advanced Refractory

Developed for low-rebound gun placement, a new refractory castable



INITIAL PINCH TYPE PLATE BENDING ROLL

Capacity 1/2" X 8'

Our Line

Light and heavy machinery for all classes of sheet metal, plate and structural work

BERTSCH & COMPANY, CAMBRIDGE CITY · INDIANA

New* ARMSTRONG *Adjustable Step Block

ARMSTRONG Adjustable Step Blocks provide safe, rigid, easily adjustable support for setting-up work. Eliminate haphazard set-ups, save time and labor.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5209 Armstrong Ave., Chicago 30, U.S.A.

Write for Catalog showing complete System of Armstrong Set-Up and Hold-Down Tools.

GOSS and DE LEEUW

MULTIPLE SPINDLE

CHUCKING MACHINES

Tool Rotating

GOSS & DE LEEUW MACHINE CO., KENSINGTON, CONN.

sets a new high for resistance to carbon monoxide disintegration. Results of standard tests, conducted by an independent testing laboratory, indicate that the new material shows no significant change in structure or strength. Conventional castables completely disintegrated or showed severe break-up in carbon-monoxide atmospheres. In the tests, samples were first preheated in normal atmospheres at 1750°F, following the recommendations of blast furnace operators for maximum service conditions. The samples were then subjected to a carbon-monoxide atmosphere at 900°F for 40 hours (ASTM C-288-56). Credit for the new castable's remarkable resistance goes to its high-alumina hydraulic cement binder, plus special CO-resistant aggregate. By reducing rebound loss for pneumatic gun placement, the new castable insures uniformity of the as-gunned monolithic structure. In addition, it provides significant savings in application. Although developed for blast furnace use, the refractory material also has applications in other metallurgical and chemical processes where carbon-monoxide atmospheres occur. With a temperature limit of 2800°F, it can be applied to bosh, inwall and topwall sections of blast furnace stacks in a matter of a few days. It takes weeks to rebrick. Gun application of the new castable for interim repairs permits lower lining costs per ton of steel. In other words, you can get complete monolithic linings in a fraction of the time required to brick up a furnace. (The Babcock & Wilcox Co., Refractories Div.)

For more data circle No. 57 on postcard, p. 91

Penetrates Rust

Here's a water-soluble chemical rust penetrant that cuts rust quickly and safely to free "frozen" parts, pipes and bound joints. And, it's actually beneficial to rubber. Also, this new penetrant is absolutely safe to use on hot or cold surfaces and in confined areas. Non-flammable, odorless, non-staining and non-toxic, it's recommended for use on heat-treating fixtures seized because of carbonization after leaving the furnace. There's no danger of contaminating the furnace atmosphere. (Dynamic Chemical Co., Inc.)

For more data circle No. 58 on postcard, p. 91

Fanciful Fence

Chain-link fence material, in a wide variety of colors and color combinations is now available for industrial, highway and residential use. The product is produced by a closely-guarded process which takes standard galvanized steel wire and

For Wire Rods,
Look to Kobe Steel -

With 35 years of experience in the production of low carbon steel wire rods, and a proud record of being the first to produce high carbon steel wire rods in Japan over 30 years ago.
Kobe Steel, with the completion of its new No. 5 mill in June of 1961, now has production capacity of 740,000 tons annually and is known as the oldest, largest and most versatile manufacturer of steel wire rods in the Far East.
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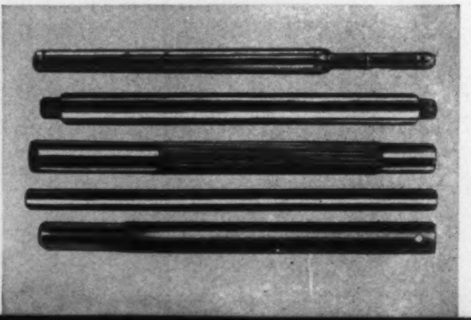

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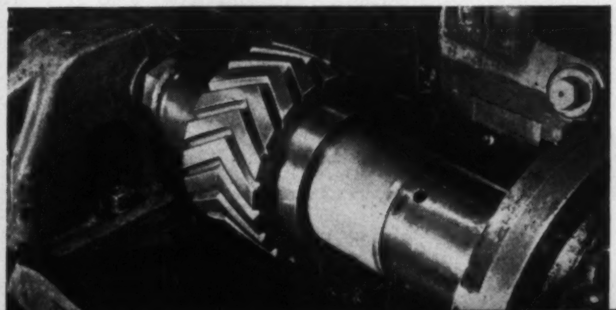

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- ☐ Pipe—Schedule 40S
- ☐ Sanitary Tubes
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- ☐ Bright Annealed
- ☐ Pipe—Lightweight Schedule 10S—5S
- ☐ Heat Exchanger Tubes

Mechanical Tubing

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- ☐ Refrigerator Tubes
- ☐ Water Wall Tubes
- ☐ Superheater Tubes
- ☐ Condenser Tubes
- ☐ Evaporator Tubes

Mechanical Tubing

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- ☐ Square Tubes
- ☐ Rectangular Tubes
- ☐ Special Smooth I. D. Hydraulic Cylinder Tubes
- ☐ Hot Rolled Tubes
- ☐ Cold Rolled Tubes
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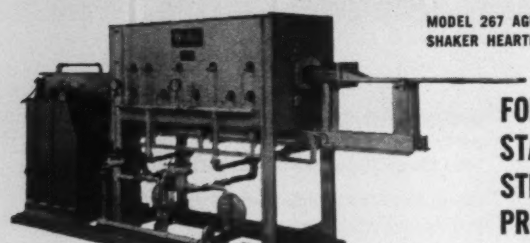

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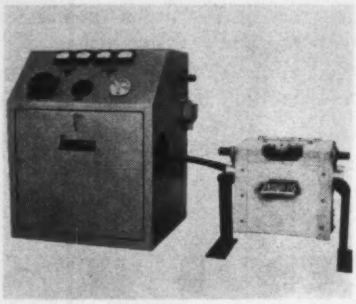
AMERICAN GAS FURNACE CO. 1004 LAFAYETTE STREET, ELIZABETH, N. J.

permanently surrounds it with a special vinyl compound. This wire is then fabricated into the fence material. The vinyl coating is virtually colorless in its natural state. Hence, by the simple addition of color, the fencing can be manufactured in any single shade or hue, or in any combination that may be desired. Initial plans are to produce and stock the fence in green, blue, salmon, white and black. Individual colors combined with white will also be stocked. (Colorguard Corp.)

For more data circle No. 59 on postcard, p. 91

Power-Control Console

Designed for use in research and development laboratories as well as in small foundries, a new heating power-control unit occupies less than 10 sq ft of floor space. Like other larger members of the company's line of high frequency controls, this 20-kw unit console contains everything necessary for operation of either of two induction-melting furnaces or heating coils. It consists of a new high-output motor-generator set, capacitors, transformers and all necessary controls and instruments. For installation, the unit is simply connected to a 220- or 440-v power supply, a water supply, and a water drain. In addition, the console may be mounted on casters and moved to any location where proper power and water connections are available. (Inductotherm Corp.)



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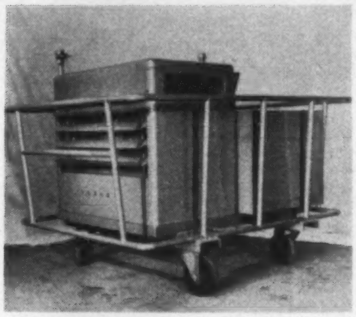
Gas-Fired Heater

Gas-fired heaters and component equipment, produced by Reznor

Mfg. Co., are the heart of an unusual portable heating unit designed for temporary spot heating. Potential applications exist in construction projects, in industrial plants, and in other similar installations. All that's needed for operation at a moment's notice is a source of fuel and an electrical supply. Heavy-duty armored hose carries natural gas to the heaters. Regular 120-v lines provide the electrical supply. The heater assembly consists of an outrigger dolly which mounts on a 300,000 Btu unit heater with an enclosed blower system. A special screen replaces the rear panel of the blower cabinet. This allows free entry of air into the cabinet. Products of combustion are exhausted into the area's atmosphere by means of a motorized vent exhauster that's attached to the heater's flue outlet. (E. L. Payne Co.)



For more data circle No. 61 on postcard, p. 91

Thread-Rolling Unit

A new thread- and form-rolling machine has been developed to meet the demand for a simple, rugged, through-feed unit. In its simplified form, this machine uses adjustable die holders that remain in the rolling position for continuous through-feed threading of long or short work. For workpieces with shoulders, a hydraulic system is available to retract dies from the rolling position. This permits return of the work to the front of the machine where it's unloaded. Taking advantage of unit construction, the manufacturer offers a variety of tooling to meet specific applications. However, the general purpose setup suits a wide range of

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The SWM-14's only "economy" is its price—$1,475. All parts are heavy-duty and readily accessible. *Compare what you get:*

- Compact, detachable wire-feed control unit—with centrifugal governor—swivel-mounted on power supply.
- 200-amp power supply (100% duty cycle) with variable voltage and inductance.
- 14-oz., 200-amp, air-cooled torch for .030-, .035- and .045-in. diameter wires.
- Shielding gas regulator-flowmeter.
- 10 ft. of argon, wire-feed, and power lines.

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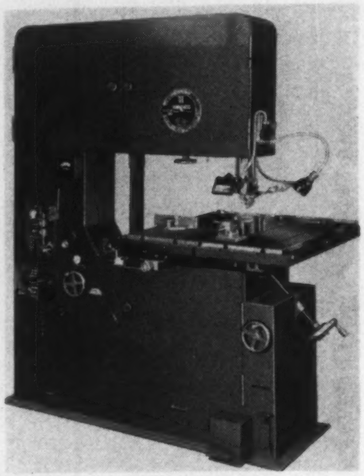
work requirements. (Reed Rolled Thread Die Co., a subsidiary of Union Twist Drill Co.)

For more data circle No. 62 on postcard, p. 91

Variable-Speed Saw

Recently added to a band-saw line is a new hydraulically-powered, variable-speed band saw which is said to save from 25-90 pct of conventional metalcutting costs. It comes with a table-tilting, guide-post adjustment, a saw-tensioning adjustment, and a speed-changing unit—all easily and quickly controlled from the front of the machine. A foot-operated control is also available for table travel or movement. The saw's powerful worm and gear transmission supplies any desired speed from 60-1000 fpm. For speeds of 35-7599 fpm, a three-speed, shifting-type transmission is furnished. Table travel is 0-20 fpm. The machine is also equipped with a high-grade tachometer, welder and grinder, and a speed selector chart giving recommendations for proper saws and saw speeds as well as file speeds. This chart shows virtually every kind of material that may be cut on the machine. As a result, it's not only very helpful to those unfamiliar with this type of cutting, it also aids in securing optimum saw useage. (The Tannewitz Works, Inc.)



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DIAMOND
Perforated Metals
are Now Produced in a NEW Streamlined Plant to meet
. . . LOW INVENTORY Purchasing Requirements

Present-day production managers cut costs by keeping inventories as low as possible and DIAMOND has cooperated . . . by carrying large stocks of materials and delivering finished or partly finished perforated metal parts in lots to meet the purchaser's production schedules.

NOW we have taken another big step to speed deliveries and cut production costs. A New Building . . . additional high-speed equipment and new straight-line operating procedures . . . all combine to assure even quicker service than was possible before.

Write us regarding ANY requirement in perforated metal. Our experienced engineers welcome opportunities to make money-saving suggestions . . . without charge or obligation. Catalog on request.

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Steel Orders Begin Rolling In

Users begin big buildup in advance of June 30 steel labor deadline.

From 10 to 12 million tons of steel will be added to inventories in the first half.

▪ The rush of steel orders is on. The big push is centered in the big consumer goods industries, but sales offices across the country are feeling the pressure.

It all stems from inventory building after the first of the year; orders for December delivery are picking up, but only moderately. But after some days of hesitation, most steel users are committed to a big buildup of steel in advance of the June 30 steel labor deadline.

It now looks like a first half buildup of 10 to 12 million tons of steel in inventories. Estimates of steelmaking operations (as a percent of capacity) go as high as 90 pct for the first half of 1962.

Biggest Day—The extent of the surge of new orders varies only by a matter of degree. Detroit sales office in the center of the automotive industry recorded its biggest day last week in two and a half years. The bulk of the orders were for after the first of the year.

As it stands now, January will be the best month since early 1960 when the post-strike steel boom was on. However, new business is not confined to early in the year. Some consumers are trying to firm up orders through May and June.

65-Day Inventory — Focal point of the buildup is the auto industry. Here are some indications of automakers' inventory plans:

One of the major auto companies will have a 65-day inventory level by the end of May with a normal June buy coming. This company has a 30-day inventory now.

Another of the Big Three has a 20-day inventory level now, but will have a 60-day inventory at the end of June. This company is adding five to eight days of inventory a month between now and June. This is the general pattern for this far-flung company with each plant making its own plans.

Contacts Supplier — One major automaker has taken the inventory buildup a step further—to its suppliers. This big producer has "advised" its suppliers to have a 60-day bank on hand by the end of June. This can be interpreted as either steel for 60 days or parts and steel on hand for a 60-day supply of parts to the automaker.

It's a simple conclusion, then, that the auto industry is setting its sights on enough steel to run out its 1962 models and even get a start on 1963's—even if there is a long steel strike.

With major industries loaded with steel at the June 30 deadline on steel labor negotiations, it would be hard for the Administration to declare a state of emergency if there is a steel strike. This means there is little chance of an early intervention by the government in the steel labor situation.

Looking ahead to the second half, a major liquidation of inventories is inevitable if there is no steel strike.

District Steel Production Indexes 1957-59=100

	Last Week	Two Weeks Ago	Month Ago	Year Ago
North East Coast	N.A.	102	111	70
Buffalo	N.A.	97	101	72
Pittsburgh	N.A.	103	105	69
Youngstown	N.A.	100	98	46
Cleveland	N.A.	115	115	90
Detroit	N.A.	147	133	97
Chicago	N.A.	112	110	80
Cincinnati	N.A.	138	127	78
St. Louis	N.A.	125	127	63
Southern	N.A.	103	101	79
Western	N.A.	110	121	75
U. S. Index	N.A.	109.8	110.4	73.4

Source: American Iron & Steel Institute

Steel Production, Composite Prices

Production	Last Week	Two Weeks Ago	To Date 1961	To Date 1960
(Net tons, 000 Omitted)	N.A.	2,046	N.A.	N.A.
Ingot Index				
(1957-59=100)	N.A.	109.8	N.A.	N.A.

Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel base (Cents per lb)	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.44	$66.44	$66.44	$66.41
Scrap No. 1 hvy (Gross ton)	$32.83	$32.83	$37.83	$28.33
No. 2 bundles	$22.83	$23.50	$25.17	$18.50

Industrial Truck Orders Rise

But prices are also set to go higher as material and labor costs rise.

Alert buyers look for value-adding truck features to get more for their money.

▪ Prices of industrial trucks will rise about 5 pct in the next six months. This is a consensus estimate of several leading truck makers.

The reasons cited for price increases are expected higher costs of raw materials and component parts used in truck construction. Also, labor costs in the industry itself are expected to rise.

Despite higher prices, companies expect greater sales through the balance of the year and early next year. This hope is based on rising backlogs of orders and the promise of greater business activity in the months ahead.

More Value—Truck makers report that while prices may be going up, alert buyers are getting more truck value for their money. They point to the continuing trend towards more detachable truck attachments. These allow a truck to do more than one job.

At the same time, one company reports that customers are applying "special" trucks to individual handling operations to "keep pace with volume handling in mass-production schedules."

Another buying trend noted by some makers is a demand for greater battery power. This is not entirely for traction and lift speeds. Companies report buyers are looking for longer duty cycles.

Safety-Minded—One truck maker reports a "major buying trend" in recent years toward improved safety. This includes such things as multiple braking systems and controls which prevent misuse of trucks. Some of the safety features add to the useful life of trucks and thus add to buyer value.

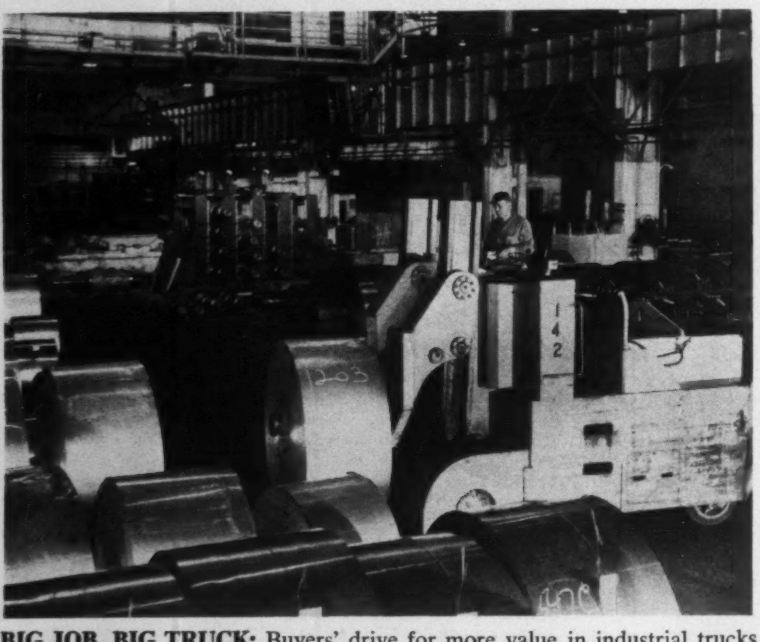
Buyers also continue their attack on costs incident to material handling in their plants. Narrow-aisle equipment continues in strong demand as buyers try to minimize floor space costs. This trend has led to increased use of remote control trucks, both in rider and "walkie" models. Remote controls allow operators to get closer to their stacking and retrieval work.

Less Maintenance—Some of the new mechanical improvements in autos are reflected in industrial trucks. The need for routine maintenance has been reduced in most makes. At least one manufacturer features "greased-for-life" construction. Veteran truck buyers point out that higher prices for such features must be weighed against less down time for equipment.

Another mechanical improvement in one make is a fully-synchronized friction clutch transmission. This permits the truck to be shifted from forward to reverse without bringing the unit to a complete stop. Reductions in gear clashing are claimed for trucks with this feature. And handling operations are speeded on jobs where frequent direction changes are necessary.

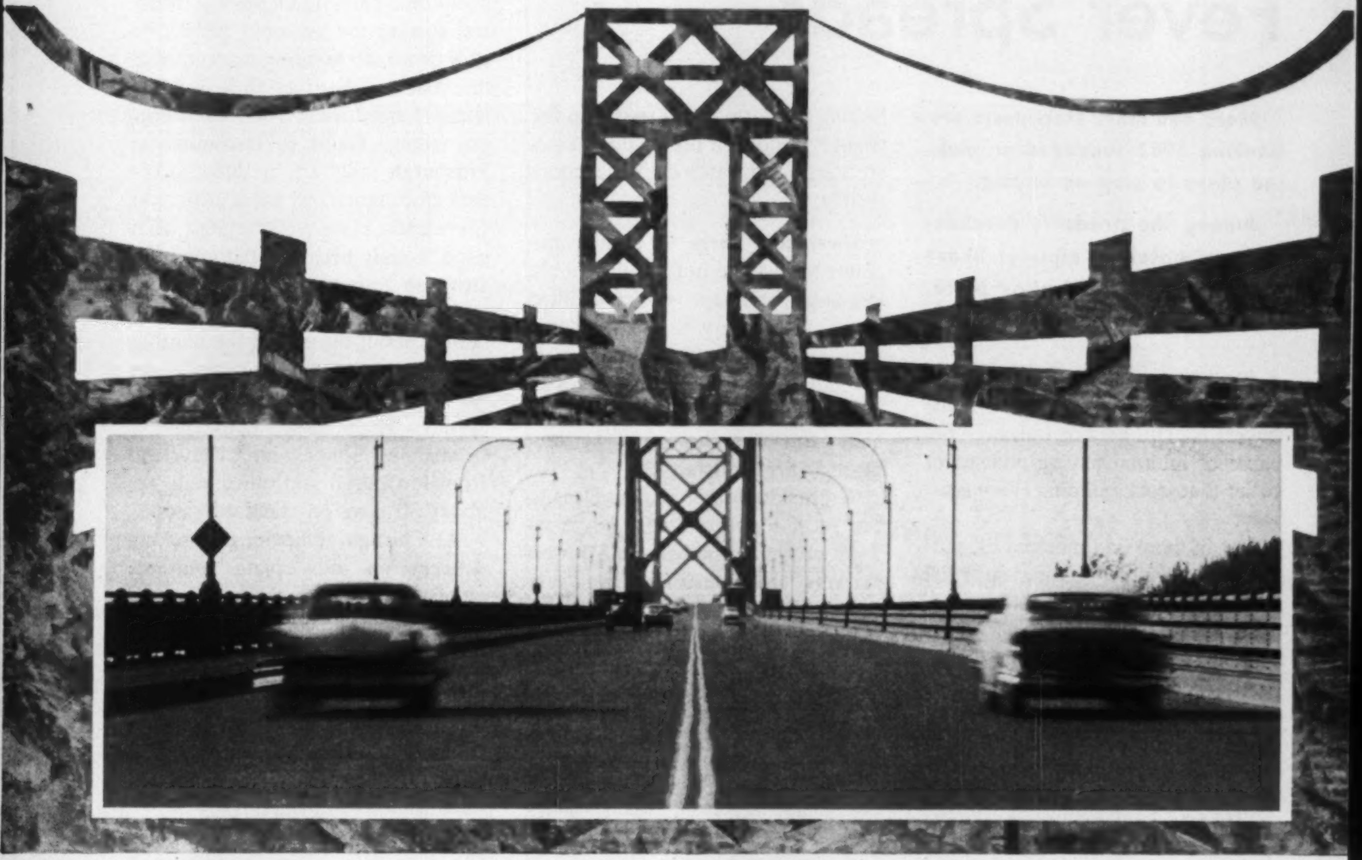
There is no apparent trend developing to upset the pattern of buyer preference between gas and electric industrial trucks.

U. S. Dept. of Commerce data shows that in August this year 2440 trucks were shipped by domestic manufacturers. Of this number, 388 were electric hand trucks, 385 were electric rider-type, and 1667 were gas-powered. This same ratio of shipments held in 1959 and 1960.



BIG JOB, BIG TRUCK: Buyers' drive for more value in industrial trucks is reflected in 30,000 lb-capacity ram truck used to move steel coils. It has more speed, longer life than older types.

Now, the strongest bridges are the fastest to build because they're . . .



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Galvanized steel sheeting—long used for permanent concrete forms in building construction—has now been adapted to do the same job for bridge engineers and with remarkable success.

On bridges and their approaches, a heavier gauge sheet is used with deepened corrugations for added strength. This new form assembly is not only strong enough to support heavy concrete slabs, but installation takes only half the time required by other types of form work.

The strength and excellent corrosion resistance of galvanized steel is also winning increasing acceptance in a wide variety of architectural uses as well as in other areas of highway construction, such as culverts and guard rails.

WEIRKOTE® IN PARTICULAR is one galvanized steel that's especially well suited to all these applications. Made by the modern continuous process, it can be worked to the very limits of its steel base without losing even a chip of its zinc protection. Weirkote is made by two National Steel divisions: Weirton Steel and Midwest Steel. For further details, write to Weirton Steel Company, Weirton, West Virginia.

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Inventory Buying Fever Spreads

More and more steel users are booking 1962 tonnages or making plans to step up buying.

Among the products purchasers are watching closely: Sheet and strip, wide and alloy plate, bar, and tinplate.

▪ Steel buyers are beginning to get the inventory building fever. Some buyers are still holding out, even because of internal buying policies or belief that stock building is unnecessary.

But in more and more cases, purchasers are either getting on 1962 mill books or making plans to do so. Many buyers are asking steel sales sources for their view of future prospects. They are apparently seeking ammunition to convince their own top men that now is the time to build.

Products to Watch—Sheet users are taking the lead in plans to build really solid inventory accumulations. Tinplate buyers are also actively lining up tonnages, some as far ahead as May, 1962.

At the moment, there is not much worry about a big steel shortage in the spring of next year. But some grades are worrying purchasing agents. These include: Sheet and strip, wide and alloy plate, bar and tinplate.

Delivery Changes — Here's why: Until now, orders and deliveries on these products have been relatively easy. Because of this, buyers have been lulled into holding inventory levels down. At the same time, mill rolling schedules have been able to take care of all emergency requests.

This situation is now changing. Buying increases could speed up the change. And as a result, purchasers are starting to watch deliveries more closely.

Sheet and Strip — Some auto plants have come in for a little more December tonnage of cold-rolled sheets. But otherwise this market is showing little. Auto steel customers are talking more specifically about their inventory programs for the first half. But they have not yet put through firm orders.

A **Pittsburgh** mill reports December sheet tonnage should be about 5 pct above November. In **Midwest** markets sheet continues on very short delivery. There are also reports of price trimming in both sheet and strip. Some mills report auto industry sheet and strip deliveries are on the upswing. Buyers are asking for rapid delivery.

As a result of this, some purchasing agents are getting worried. They are concerned that sheet deliveries may shoot out. Some large sheet users are starting to accumulate heavy inventories as a strike hedge.

Bar — These products continue lagging behind the general level of the market. On the **East Coast** deliveries are still short and buyers are showing little interest in building stocks. However, in the **Midwest** bar mills are running at about 18 or 20 turns a week—fairly close to capacity. Gains in auto bar and farm equipment bar buying could stretch lead times in the first quarter.

Plates and Shapes — For many mills November orders are running about on a par with October's. Mills are waiting for seasonal factors to slow down the building market. But this year the construction season has lasted longer than usual in northern states. Gains in December at **Pittsburgh** mills are credited to orders from structural fabricators. At **Cleveland,** plate volume has been good, largely because of strong construction activity.

Structurals mills there, while concerned about the end of the outdoor building season, are looking ahead to new construction projects next spring. Right now, deliveries of beams and shapes into Cleveland from Pittsburgh and other mills are about 30 days on standard sizes.

At **Chicago,** difficulties in getting delivery on alloy plate continue. Other wide plate grades are less tight than they have been.

Tinplate—Buyers are anxious to place first quarter or first half bookings with mills. **East Coast** users are wasting little time in getting on mill books. At least one buyer has put in tonnages through May.

At **Pittsburgh,** orders continue to run 5 to 10 pct over expectations for one producer. Mill men believe thin tinplate could produce a real scramble in next year's schedules. Production men are not sure how well output will hold up on the interim facilities now being used.

In addition to an extra rolling operation, the thin plate must frequently be put back through electrolytic lines for cleaning.

Pipe and Tubing—Field stocks of oil country tubular goods amount to 500,000 tons and represent an investment of $100 million, according to A. B. Maxwell, Jr., president, Pittsburgh Steel Co. He says these stocks will begin to gravitate into users' hands as the steel strike deadline passes.

PURCHASING AGENT'S CHECKLIST

Pentagon's new buying policy causes industry shifts.	P. 43
Brown & Sharpe's trade-in policy on screw machines pays off for company—and buyers.	P. 63
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COMPARISON OF PRICES

(Effective Nov. 17, 1961)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Nov. 17 1961	Nov. 13 1961	Oct. 23 1961	Nov. 21 1960
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	14.10
Stainl's C-R strip (No. 302)	49.50	49.50	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plates (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchant bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	46.75
Wrought iron bars	14.90	14.90	14.90	14.90
Wire: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 10 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.49¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Nov. 17 1961	Nov. 13 1961	Oct. 23 1961	Nov. 21 1960
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.68	$70.68	$70.68	$70.11
Foundry, South Cin't.	71.92	71.92	71.92	71.92
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd. Philadelphia	70.11	70.11	70.11	69.61
Basic Valley furnace	66.00	66.00	66.00	66.00
Malleable, Cnicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese 74-76 pctMn. Cents per lb‡	11.00	11.00	11.00	11.00
Pig Iron Composite: (per gross ton)				
Pig Iron	$66.44	$66.44	$66.44	66.32
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$33.50	$33.50	$36.50	$26.50
No. 1 steel, Phila. area	33.50	33.50	39.50	33.00
No. 1 steel, Chicago	31.50	31.50	37.50	25.50
No. 1 bundles, Detroit	29.50	29.50	32.50	21.50
Low phos., Youngstown	36.50*	37.50	39.00	28.50
No. 1 mach'y cast., Pittsburgh	44.50	44.50	45.50	45.50
No. 1 mach'y cast., Phila.	47.50	47.50	49.50	47.50
No. 1 mach'y cast., Chicago	44.50	44.50	47.50	41.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$32.83	$32.83	$37.83	$28.33
No. 2 bundles	22.83*	23.50	25.17	18.50
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.75-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper electrolytic, Conn.	$31.00	$31.00	$31.00	$30.00
Copper Lake, Conn.	31.00	31.00	31.00	30.00
Tin, Straits, N. Y.	123.625†	123.125	120.25	103.25
Zinc, East St. Louis	11.50	11.50	11.50	13.00
Lead, St. Louis	9.80	9.80	11.00	11.80
Aluminum, ingot	24.00	24.00	24.00	26.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. * Revised.

Finished Steel Composite

Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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Tilting 700-tons of steel furnace

CONE-DRIVE GEARS

DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

Here's a closeup of tilting mechanism for an electric furnace. Standard, stock model, double-reduction Cone-Drive **double-enveloping worm** gear speed reducer tilts furnace and heat with combined weight of 700 tons.

Powerful Cone-Drive gearing is available **in gearsets, speed reducers and gearmotors.**

IRON AND STEEL SCRAP MARKETS

A Shaky Market Looks to Future

Soft market reported this week. Most dealers feel it could go either up or down.

No clear trends have developed yet, but the situation is beginning to level off in some areas.

▪ Most scrap dealers and traders are treading water this week, probing for bottom. They hope to find prices now on solid ground, but most are finding soft footing.

Generally the market situation is continuing to level off with some price drops still being recorded. The market faces possibility of another price drop, although some dealers look for signs of an upturn.

Relief can be expected with a steel buildup which could come prior to next year's steelworkers' negotiations. Most dealers hope the upturn is sighted before then, but have no basis for any optimism.

Perhaps an omen of things to come was bullish action taken by some dealers in Chicago. But it might have been too weak and too scattered to effect any changes.

Export continues to remain dormant. All hopes in that market are pinned on late January when spring orders should begin to arrive.

The Iron Age composite price for No. 1 heavy melting is at $32.83 for the second straight week. The No. 2 bundles composite price dropped to $22.83 from $23.50 on the basis of a price drop in Chicago.

Pittsburgh—The market has an uncertain look. Some feel prices have firmed. They say dealers are not pushing to sell at present levels. However, others point out there is still little or no demand and that industrial scrap is coming on the market in large quantities. Plants are said to be offering additional tonnages for sale in the present month and are due to come out soon with December lists. Last month consumers in the immediate area showed no interest in factory bundles. Balancing out all the factors, one broker said prices could go up or down on the next list.

Chicago—Mills were able to purchase a few grades at reduced prices again over the past week. A split situation developed as No. 2 grades moved at reduced prices while new industrial lists continued to move at previously established price levels. Despite the lower mill price offers, a few bullish comments appeared in the scrap picture, as dealers attempted to lay down scrap, and continued to turn down offers at lower prices. Mill resistance continues stiff. Most important break was the purchase of a fairly large quantity of No. 2 bundles at $2 under going prices.

Philadelphia—The market seems to have reached a temporary levelling-off point. It's the second week of unchanged, but unsteady, prices. Big question here is whether the bottom has been reached. Lower prices have stopped the flow of scrap. Dealers expect buyers to begin inquiring again within the next few weeks. How anxious they are to buy will determine the future price trend.

New York — Some dealers say there are signs of steadiness in steelmaking grades. Others say these grades are still very weak. But weak or steady they are unchanged this week. Cast grades are very weak, down $1 on appraisal.

Detroit—If the market continues to move at its present sluggish pace, a slight weakening is expected by the end of November. Exporters might buy industrial bundles if they drop another $1.

Cleveland—The market is off another $1 on appraisal here and in the Valley as it continues to feel for bottom. Another drop in production bundle prices is expected due to heavy tonnage and lack of interest by big mills. The next Valley buy is expected to be at about a $35 level for No. 1 dealer grades. Foundry business is still quiet.

Cincinnati—Word that one mill may re-enter the market after about five months of inactivity has heartened scrap traders. Most feel the present slump has finally bottomed out and will level off for a while.

St. Louis—The scrap market is quiet. Weakness in export business continues to worry dealers. Mills are doing some buying. Dealer and mill supplies are plentiful. The outlook is bleak until early 1962.

Birmingham — An Alabama openhearth consumer continues to hold up shipments of scrap purchased last month, and there is no new buying either by mills, foundries or other consumers. Practically all orders placed the first of the months have been filled and everyone seems to be marking time.

Buffalo—The market is definitely weaker this week. There's a strong possibility of further price cuts to meet the continued pressure from outside markets.

Boston—The market is very quiet. Prices have fallen because of a lack of business.

Houston—The market continues to exude weakness with cast showing the most at this time. Export has slowed to a walk.

West Coast—Despite successive price drops, the market is still weak and lackadaisical.

SCRAP PRICES *(Effective Nov. 17, 1961)*

Pittsburgh

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	34.00 to 35.00
No. 1 factory bundles	39.00 to 40.00
No. 2 bundles	25.00 to 26.00
No. 1 busheling	33.00 to 34.00
Machine shop turn.	14.00 to 15.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	18.00 to 19.00
Low phos. punch'gs plate	41.00 to 42.00
Heavy turnings	29.00 to 30.00
No. 1 RR hvy. melting	39.00 to 40.00
Scrap rails, random lgth.	44.00 to 45.00
Rails 2 ft and under	49.00 to 50.00
RR specialties	44.00 to 45.00
No. 1 machinery cast.	44.00 to 45.00
Cupola cast.	36.00 to 37.00
Heavy breakable cast.	31.00 to 32.00
Stainless	
18-8 bundles and solids	180.00 to 185.00
18-8 turnings	110.00 to 115.00
430 bundles and solids	80.00 to 85.00
410 turnings	50.00 to 55.00

Chicago

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	28.00 to 29.00
No. 1 dealer bundles	31.00 to 32.00
No. 1 factory bundles	35.00 to 36.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	32.00 to 33.00
Machine shop turn.	15.00 to 16.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Low phos. forge crops	42.00 to 43.00
Low phos. punch'gs plate, ¼ in. and heavier	41.00 to 42.00
Low phos. 2 ft and under	38.00 to 39.00
No. 1 RR hvy. melting	34.00 to 35.00
Scrap rails, random lgth.	42.00 to 43.00
Rerolling rails	55.00 to 57.00
Rails 2 ft and under	47.00 to 48.00
Angles and splice bars	40.00 to 41.00
RR steel car axles	53.00 to 54.00
RR couplers and knuckles	40.00 to 41.00
No. 1 machinery cast.	44.00 to 45.00
Cupola cast.	37.00 to 38.00
Cast iron wheels	33.00 to 34.00
Malleable	42.00 to 43.00
Stove plate	31.00 to 32.00
Steel car wheels	38.00 to 39.00
Stainless	
18-8 bundles and solids	165.00 to 170.00
18-8 turnings	95.00 to 100.00
430 bundles and solids	80.00 to 85.00
430 turnings	45.00 to 50.00

Philadelphia Area

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	35.00 to 36.00
No. 2 bundles	22.00 to 23.00
No. 1 busheling	35.00 to 36.00
Machine shop turn.	12.00 to 13.00
Mixed bor. short turn.	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	18.00 to 19.00
Clean cast. chem. borings	29.00 to 30.00
Low phos. 5 ft and under	38.00 to 40.00
Low phos. 2 ft punch'gs.	40.00 to 41.00
Elec. furnace bundles	37.00 to 38.00
Heavy turnings	26.00 to 27.00
RR specialties	40.00 to 41.00
Rails, 18 in. and under	48.00 to 49.00
Cupola cast.	38.00 to 39.00
Heavy breakable cast.	38.00 to 39.00
Cast iron car wheels	40.00 to 41.00
Malleable	47.00 to 48.00
No. 1 machinery cast.	47.00 to 48.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$31.50 to $32.50
No. 2 hvy. melting	25.00 to 26.00
No. 1 dealer bundles	34.50 to 35.50
No. 2 bundles	18.00 to 19.00
Machine shop turn.	8.00 to 9.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Low phos. 18 in. and under	39.00 to 40.00
Rails, random length	41.00 to 42.00
Rails, 18 in. and under	47.00 to 48.00
No. 1 cupola cast.	34.00 to 35.00
Heavy breakable cast.	29.00 to 30.00
Drop broken cast.	44.00 to 45.00

Youngstown

No. 1 hvy. melting	$34.50 to $35.50
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	34.50 to 35.50
No. 2 bundles	21.00 to 22.00
Machine shop turn.	17.00 to 18.00
Shoveling turnings	19.00 to 20.00
Low phos. plate	36.00 to 37.00

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Cleveland

No. 1 hvy. melting	$31.50 to $32.50
No. 2 hvy. melting	22.00 to 23.00
No. 1 dealer bundles	31.50 to 32.50
No. 1 factory bundles	35.50 to 36.50
No. 2 bundles	19.00 to 20.00
No. 1 busheling	31.50 to 32.50
Machine shop turn.	14.00 to 15.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Cut structural & plates, 2 ft & under	37.00 to 38.00
Low phos. punch'gs plate	32.50 to 33.50
Drop forge flashings	31.50 to 32.50
Foundry steel, 2 ft & under	32.50 to 33.50
No. 1 RR hvy. melting	35.00 to 36.00
Rails 2 ft and under	45.00 to 46.00
Rails 18 in. and under	46.00 to 47.00
Steel axle turnings	24.00 to 25.00
Railroad cast.	42.00 to 43.00
No. 1 machinery cast.	43.00 to 44.00
Stove plate	37.00 to 38.00
Malleable	48.00 to 49.00
Stainless	
18-8 bundles	160.00 to 165.00
18-8 turnings	95.00 to 100.00
430 bundles	75.00 to 80.00

Buffalo

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	25.00 to 26.00
No. 1 busheling	28.00 to 29.00
No. 1 dealer bundles	28.00 to 29.00
No. 2 bundles	23.00 to 24.00
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	14.00 to 15.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	15.00 to 16.00
Low phos. plate	34.00 to 35.00
Structural and plate, 2 ft and under	36.00 to 37.00
Rails 2 ft and under	47.00 to 48.00
Scrap rails, random lgth.	37.00 to 38.00
No. 1 machinery cast.	43.00 to 44.00
No. 1 cupola cast.	37.00 to 38.00

St. Louis

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	26.00 to 27.00
Foundry steel, 2 ft.	28.00 to 29.00
No. 1 dealer bundles	32.00 to 33.00
No. 2 bundles	21.00 to 22.00
Machine shop turn.	13.50 to 14.50
Shoveling turnings	15.50 to 16.50
Cast iron borings	21.00 to 22.00
No. 1 RR hvy. melting	34.00 to 35.00
Rails random lengths	38.00 to 39.00
Rails, 18 in. and under	43.00 to 44.00
RR specialties	38.00 to 39.00
Cupola cast.	34.00 to 35.00
Heavy breakable cast.	31.00 to 32.00
Stove plate	30.00 to 31.00
Cast iron car wheels	33.00 to 34.00
Rerolling rails	53.00 to 54.00
Unstripped motor blocks	33.00 to 34.00

Birmingham

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 dealer bundles	33.00 to 34.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	36.00 to 37.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	9.00 to 10.00
Electric furnace bundles	36.00 to 37.00
Elec. furnace, 3 ft & under	34.00 to 35.00
Bar crops and plate	41.00 to 42.00
Structural and plate, 2 ft.	40.00 to 41.00
No. 1 RR hvy. melting	34.00 to 35.00
Scrap rail, random lgth.	40.00 to 41.00
Rails, 18 in. and under	44.00 to 46.00
Angles and splice bars	44.00 to 45.00
No. 1 cupola cast.	38.00 to 39.00
Stove plate	38.00 to 39.00
Cast iron car wheels	33.00 to 34.00
Unstripped motor blocks	29.00 to 30.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	21.00 to 22.00
No. 2 dealer bundles	15.00 to 16.00
Mixed bor. and turn.	5.00 to 6.00
Machine shop turnings	5.00 to 6.00
Shoveling turnings	7.00 to 8.00
Clean cast. chem. borings	19.00 to 20.00
No. 1 machinery cast.	36.00 to 37.00
Mixed yard cast.	33.00 to 34.00
Heavy breakable cast.	31.00 to 32.00
Stainless	
18-8 prepared solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 prepared solids	65.00 to 70.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	26.00 to 27.00
Drop forge flashings	26.00 to 27.00
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Heavy breakable cast.	27.00 to 28.00
Mixed cupola cast.	30.00 to 31.00
Automotive cast.	39.00 to 40.00
Stainless	
18-8 bundles and solids	170.00 to 175.00
18-8 turnings	75.00 to 80.00
430 bundles and solids	65.00 to 70.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$25.00 to $26.00
No. 2 hvy. melting	18.00 to 19.00
No. 1 dealer bundles	26.00 to 27.00
No. 2 bundles	15.00 to 16.00
No. 1 busheling	26.00 to 27.00
Machine shop turn.	3.00 to 4.00
Shoveling turnings	8.00 to 9.00
Clean cast. chem. borings	17.50 to 18.50
No. 1 machinery cast.	38.00 to 39.00
Mixed cupola cast.	30.00 to 31.00
Heavy breakable cast.	28.00 to 29.00

San Francisco

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	30.00
No. 1 dealer bundles	25.00
No. 2 bundles	21.00
Machine shop turn.	12.00
Cast iron borings	12.00
No. 1 cupola cast.	47.00

Los Angeles

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	30.00
No. 1 dealer bundles	24.00
No. 2 bundles	21.00
Machine shop turn.	12.00
Shoveling turnings	12.00
Cast iron borings	12.00
Elec. furnace 1 ft and under (foundry)	44.00
No. 1 cupola cast.	45.00

Seattle

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	30.00
No. 2 bundles	21.00
No. 1 cupola cast.	34.00
Mixed yard cast.	29.00

Hamilton, Ont.

Brokers buying prices per net ton on cars:

No. 1 hvy. melting	$27.00
No. 2 hvy. melting cut 3 ft and under	24.00
No. 1 dealer bundles	28.00
No. 2 bundles	21.50
Mixed steel scrap	19.00
Bush., new fact., prep'd.	27.00
Bush., new fact., unprep'd.	21.00
Machine shop turn.	8.00
Short steel turn.	12.00
Mixed bor. and turn.	12.00
Cast scrap	32.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$33.00
No. 2 hvy. melting	30.00
No. 2 bundles	21.00
Machine shop turn.	12.00
Shoveling turnings	15.00
Cut structural plate 2 ft & under	$42.00 to 43.00
Unstripped motor blocks	28.00 to 29.00
Cupola cast.	34.00 to 35.00
Heavy breakable cast.	28.00 to 29.00

New Aluminum Plan May Expand Usage

Plan for increasing free world consumption of aluminum calls for governmental cooperation.

U. S. would concede some imports to gain firm foothold in expanding under-developed markets.

▪ Positive thinking in the aluminum industry has helped form a new plan. It could expand world use of aluminum and solve several pressing problems. Overproduction and sagging profits prodded the industry to take the new approach.

New Markets—The basis for the plan is the theory that world aluminum producers should place less emphasis on scrambling for established markets, and put more emphasis on expanding markets in under-developed countries.

Increasing Free World Aluminum Consumption, the foreign trade plan, was devised by the Foreign Trade Committee of The Aluminum Assn. It was presented by The Aluminum Smelters Research Institute, The Aluminum Extruders Council, American Die Casting Institute and the National Assn. of Aluminum Distributors.

Negotiation and cooperation at the governmental level are the two demands of the industry.

Imports Conceded—U. S. government and industry officials would confer on how much of the domestic market should be conceded to imports. The plan suggests that since imports were 2.7 pct of the U. S. market last year a slightly higher figure should be adopted.

The government would negotiate with countries shipping tonnages of aluminum to the U. S. The U. S. would ask that they voluntarily restrict exports here to the adopted figure. And open the door (by lowering fabricated tariffs) to U. S. aluminum in the amount of the difference between their capacity and demand.

Sliding Scale — America would promise to raise the percent of the U. S. market for imports as demand increases. And it would convey the offer of the U. S. aluminum industry to "work closely with other countries to help them stimulate their usage of aluminum through product and market development."

As soon as this is accomplished the U. S. aluminum industry would step up its marketing operations in the under-developed countries. The industry figures there's plenty of room for improvement.

The Big Portion — The report states that in the U. S., 6 pct of the world population is using 37 pct of world aluminum. In under-developed areas of Africa, Asia and South America, 44 pct of the world population uses only 4 pct of the world aluminum output.

The plan was released to the press before the industry officially informed the government of it. Although some Commerce officials have been aware of it for some time, an aluminum spokesman says he has heard no objections.

Extra Backing—Public reaction which is expected to favor the plan will be a strong element for the industry to use in approaching government sources. The aluminum industry will contact the State Dept. and any other government agencies that could help.

One spokesman suggested congressional committees might look into this plan, and suggested the industry will make every effort to reach the congressmen before the next session.

The timetable—Industry expects to start some talks with the U. S. government within several weeks.

The industry suggests the voluntary restrictions be for a minimum of five years, commencing in 1963.

Why is the aluminum industry reaching so far for an answer to the problems of imports, overproduction, high Common Market tariffs etc.?

Plain Reasoning—The fact is that there is really little choice. This is not an attempt to get relief from injury as a request for higher tariff would be. An industry spokesman concedes that the industry just isn't in a position to be allowed any tariff increases.

The most apparent approach must be voluntary restrictions by other countries.

Tin Prices for the Week

November 14—122.875; November 15—123.125; November 16—123.50; November 17—123.625.*
* Estimate.

Primary Prices

(cents per lb.)	current price	last price	date of change
Aluminum Ingot	24.00	26.00	9/25/61
Copper (E)	31.00	30.00	5/16/61
Copper (CS)	31.00	30.00	5/17/61
Copper (L)	31.00	30.00	5/17/61
Lead, St. L.	9.80	10.30	11/13/61
Lead, N. Y.	10.00	10.50	11/13/61
Magnesium Ingot	36.00	34.50	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	81.25	74.00	6/30/61
Titanium sponge	150–160	162–182	8/1/59
Zinc, E. St. L.	11.50	12.50	1/12/61
Zinc, N. Y.	12.00	13.00	1/12/61

ALUMINUM: 99% Ingot. COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. Other primary prices, pg. 115.

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb. f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.030–.037	.047–.060	.076–.096	.154–.250
1100, 3003	47.4	46.4	45.4	44.4
5062	54.8	52.0	49.8	46.8
6061-0	53.0	50.3	48.4	47.9

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size"	7/32–5/16	11/32–23/32	3/4–1 1/16	1 3/32–1½
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250–2.00	.188	.081	.032
AZ31B Stand, Grade	......	67.9	69.0	77.9	103.1
AZ31B Spec.	......	93.3	96.9	108.7	171.3
Tread Plate	......	70.6	71.7	......	......
Tooling Plate	73.0	......	......	......	......

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting)	37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting)	40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	147	126	145
Strip, CR	133	114	145
Rod, bar, HR	116	95	116
Angles, HR	116	95	116
Plates, HR	139	116	133
Shot, blocks	...	93	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	56.13	....	53.61	57.32
Brass, Yellow	49.27	49.56	49.21	53.43
Brass, Low	52.15	52.44	52.09	56.21
Brass, Rod	53.17	53.46	53.11	57.23
Brass, Naval	53.94	60.25	47.75	58.10
Muntz Metal	51.94	....	47.25	....
Comm. Bz.	54.73	55.02	54.67	58.34
Mang. Bz.	57.71	61.54	51.27	....
Phos. Bz. 5%	76.97	76.72	77.47	78.90

Free Cutting Brass Rod	34.77

TITANIUM

(Base 30,000 lb, f.o.b. customer's plant)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17. Plate HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.	32.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be	$ 5.00
Beryllium copper, per lb conta'd Be.	$43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading	$70.00
Bismuth, ton lots	$ 2.25
Cadmium, del'd	$ 1.70
Calcium, 99.9% small lots	$ 4.55
Chromium, 99.8% metallic base	$ 1.31
Cobalt, 97-99% (per lb)	$1.50 to $ 1.57
Germanium, per gm, f.o.b. Miami, Okla., refined	$29.95 to $36.95
Gold, U. S. Treas., per troy oz.	$ 2.25
Iridium, dollars per troy oz.	$75 to $85
Lithium, 98%	$9.00 to $12.00
Magnesium sticks, 10,000 lb.	57.00
Mercury dollars per 76-lb flask f.o.b. New York	$188 to $191
Nickel oxide sinter at Buffalo, N. Y. or other U. S. points of entry, contained nickel	77.50
Palladium, dollars per troy oz.	$24 to $26
Platinum, dollars per troy oz.	$82 to $85
Rhodium	$137 to $140
Silver ingots (¢ per troy oz.)	91.375
Thorium, per pg	$43.00
Vanadium	$ 3.65
Zirconium sponge	$ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot	
No. 115	32.00
No. 120	31.25
No. 123	30.50
80-10-10 ingot	
No. 305	36.00
No. 315	33.75
88-10-2 ingot	
No. 210	43.75
No. 215	40.50
No. 245	35.75
Yellow ingot	
No. 405	27.50
Manganese bronze	
No. 421	31.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95.5 aluminum-silicon alloys	
0.30 copper max.	23.25-23.75
0.60 copper max.	23.00-23.50
Piston alloys (No. 132 type)	25.00-26.00
No. 12 alum. (No. 2 grade)	21.25-21.75
108 alloy	21.75-22.25
195 alloy	24.25-24.75
13 alloy (0.60 copper max.)	23.00-23.50
AXS-679 (1 pct zinc)	21.50-22.50

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½%	22.75-23.75
Grade 2—92-95%	21.50-22.50
Grade 3—90-92%	20.50-21.50
Grade 4—85-90%	19.50-20.50

(Effective Nov. 17, 1961)

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	27	26¼
Yellow brass	20⅝	18½
Red brass	23⅞	23½
Comm. bronze	24¾	24
Mang. bronze	19¼	18½
Free cutting rod ends	19½	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	26¾
No. 2 copper wire	24¾
Light copper	22½
*Refining brass	23½
Copper bearing material	22½

*Dry Copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	26¾
No. 2 copper wire	24¾
Light copper	22½
No. 1 composition	24
No. 1 comp. turnings	23½
Hvy. yellow brass solids	17½
Heavy yellow brass turnings	16½
Radiators	20
Aluminum	
Mixed old cast.	12 —12½
Mixed new clips	14 —14½
Mixed turnings, dry	13 —13½

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire	23 —23½
No. 2 copper wire	21 —21½
Light copper	18¾—19¼
Auto radiators (unsweated)	16¼—16½
No. 1 composition	20 —20½
No. 1 composition turnings	19½—20
Cocks and faucets	16½—17
Clean heavy yellow brass	14 —14½
Brass pipe	16¼—16¾
New soft brass clippings	17¾—18¼
No. 1 brass rod turnings	15½—16

Aluminum

Alum. pistons and struts	6½— 7
Aluminum crankcase	9 — 9½
1100 (2s) aluminum clippings	11¼—11¾
Old sheet and utensils	9 — 9½
Borings and turnings	4 — 4½
Industrial castings	8¾— 9¼
2020 (24S) clippings	10 —10½

Zinc

New zinc clippings	5 — 5¼
Old zinc	3 — 3¼
Zinc routings	1¾— 2
Old die cast scrap	1¾— 2

Nickel and Monel

Pure nickel clippings	56 —58
Clean nickel turnings	43
Nickel anodes	56 —58
Nickel rod ends	56 —58
New Monel clippings	26 —26½
Clean Monel turnings	18½—19
Old sheet Monel	25 —25½
Nickel silver clippings, mixed.	20
Nickel silver turnings, mixed.	17

Lead

Soft scrap lead	6¼— 6½
Battery plates (dry)	2 — 2¼
Batteries, acid free	1¼— 1½

Miscellaneous

Block tin	90 —92
No. 1 pewter	65 —67
Auto babbitt	46 —47
Mixed common babbitt	10 —10½
Solder joints	15 —15½
Small foundry type	9 — 9½
Monotype	9¼— 9¾
Lino. and sterotype	8½— 8¾
Electrotype	8 — 8¼
Hand picked type shells	5¾— 6¼
Lino. and stereo. dross	1¾— 2¼
Electro dross	2½— 3

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES, STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	**Bethlehem, Pa.**			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$99.50 *A2*	$121.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*	8.10 *P2*	5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	**Alton, Ill.**								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.425 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1, P11, B9*	7.575 *G3*	10.80 *S1*		
	Andersen, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3, Y1*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Struthers, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*		5.50 *Y1*			5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, N. Castle, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *B4, M10*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	**Fontana, Cal.**	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	**Atlanta, Ga.**					5.70 *A8*			5.10 *A8*					
	Fairfield, Ala. Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

Electro-galvanized-plus galvanizing extras

(Effective Nov. 17, 1961)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Electro-galvanized	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.		Cokes▲ *1.25*-lb. base box	Electro▲▲ *0.25*-lb. base box	Thin *0.25* lb. coating in coils
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*					7.525 *B3*	9.275 *B3*	6.40 *W6, S15*	†Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price 0.75 lb./0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. ▲ COKES: 1.50-lb. add 25¢. ▲▲ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		Prices are for 50 lb. base box; for 45 lb. deduct 15¢; for 55 lb. add 15¢; for 60 lb. add 30¢.
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*					7.575 *A2*					
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*					7.575 *U1*	9.325 *U1*			$9.10 *U1*	$6.25 *U1*
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*		6.775 *B3*		7.525 *B3*	9.275 *B3* 10.025 *B3**	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	$6.25 *B3*
	Worcester, Mass.									6.70 *A5*			
MIDDLE WEST	Alton, Ill.									6.60 *L1*	**Hollowware Enameling** *29* ga.—*7.85 U1* at Gary; Pittsburgh; *J3* at Aliquippa; *W5* at Yorkville; *Y1* at Indiana Harbor; *W5* at Wheeling; *7.95 G2* at Granite City.		
	Ashland, Ky.	5.10 *A7*		6.875 *A7*		6.775 *A7*		7.525 *A7*					
	Canton-Massillon, Dover, Canfield, Ohio			6.875 *R1, R3*	7.50 *C19*								
	Chicago, Joliet, Ill.	5.10 *W8, A1*						7.525 *U1, W8*		6.40 *A5, R3,W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*		7.65 *R3*	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*	6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*					7.525 *G3*	9.275 *G3*				
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3,Y1*	6.275 *U1, I3,Y1*	6.875 *U1, I3, Y1.*		6.775 *U1, I3,Y1*	7.225 *U1*	7.525 *U1, Y1,I3*	9.275 *U1, Y1*	6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1Y1,*	$6.25 *U1,I3*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*				7.225 *E2*						
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	7.225 *A7*	6.775 *A7*	7.225 *A7*						
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3*	7.65 *R3*	6.775 *S1*	7.225 *S1*†† *R3*	7.525 *R3, S1*	9.275 *R3*			$9.10 *R3*	
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	5.10 *U1, J3,P6*	6.275 *U1, J3,P6*	6.875 *U1, J3*	7.50 *E3*	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3* 10.125 *U1, J3**	6.40 *A5, J3,P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	$6.25 *U1, J3*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3,W5*	6.875 *W3, W5*	7.50 *W3*		7.225 *W3*	7.525 *W3*	9.275 *W3*		$10.40 *W5, W3*	$9.10 *W5, W3*	$6.40 *W5*** $6.25 *W3*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*			6.775 *Y1*		7.525 *Y1*	9.275 *Y1*	6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*					8.25 *K1*	10.40 *K1*		$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*		6.775 *T2*				6.40 *T2,R3*	$10.40 *T2*	$9.10 *T2*	$6.25 *T2*
	Houston, Texas									6.65 *S2*			

Hi Str. Low Alloy Galv. ** For 55 lb.; for 60 lb. add 15¢.

†† 7.425 at Sharon; Niles is 7.225.

(Effective Nov. 17, 1961)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.		Listing reinforcing bar prices has been suspended. Major producers now quote prices only in response to specific inquiries.		6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3, S15*		7.70 *B5*	6.725 *B3,R3, S15*	9.025 *B3,B5, S15*	8.30 *B3*	5.30 *B3*				8.00 *W6, S15*
	Claymont, Del.							5.30 *P2*	6.375 *P2*	7.50 *P2*	7.95 *P2*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Milton, Pa.	5.825 *M7*										
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*			6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Steelton, Pa.											
	Fairless, Pa.	5.825 *U1*										
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.							5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*		7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*		7.65 *A5,C13, W13*		9.025 *A5, C13,W13*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,W13*
	Detroit, Plymouth, Mich.	5.675 *G3*		7.90 *P3* 7.85 *P8B5H2* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8, H2* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*		7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, Y1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.											8.10 *C9*
	Sterling, Ill.	5.775 *N4*					7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*		7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Youngstown, Steubenville, O.	5.675 *U1,R3, Y1*		7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1,W5, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.375 *K1*			7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*			6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*		9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*						6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*										
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*					9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*			7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga. Jacksonville, Fla.	5.875 *A8*										8.00 *A8* 8.35 *M4*
	Fairfield, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*		8.10 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas, Sand Springs, Okla.	5.925 *S2*			6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher.

(Effective Nov. 17, 1961)

* Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1	Acme Steel Co., Chicago
A2	Alan Wood Steel Co., Conshohocken, Pa.
A3	Allegheny Ludlum Steel Corp., Pittsburgh
A4	American Cladmetals Co., Carnegie, Pa.
A5	American Steel & Wire Div., Cleveland
A6	Angel Nail & Chaplet Co., Cleveland
A7	Armco Steel Corp., Middletown, Ohio
A8	Atlantic Steel Co., Atlanta, Ga.
A9	Acme-Newport Steel Co., Newport, Ky.
A10	Alaska Steel Mills, Inc., Seattle, Wash.
B1	Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2	Bethlehem Steel Co., Pacific Coast Div.
B3	Bethlehem Steel Co., Bethlehem, Pa.
B4	Blair Strip Steel Co., New Castle, Pa.
B5	Bliss & Laughlin, Inc., Harvey, Ill.
B6	Brooke Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7	A. M. Byers, Pittsburgh
B8	Braeburn Alloy Steel Corp., Braeburn, Pa.
B9	Barry Universal Corp., Detroit, Mich.
C1	Calstrip Steel Corp., Los Angeles
C2	Carpenter Steel Co., Reading, Pa.
C6	Colorado Fuel & Iron Corp., Denver
C7	Columbia Geneva Steel Div., San Francisco
C8	Columbia Steel & Shafting Co., Pittsburgh
C9	Continental Steel Corp., Kokomo, Ind.
C10	Copperweld Steel Co., Pittsburgh, Pa.
C11	Crucible Steel Co. of America, Pittsburgh
C13	Cuyahoga Steel & Wire Co., Cleveland
C14	Compressed Steel Shafting Co., Readville, Mass.
C15	G. O. Carlson, Inc., Thorndale, Pa.
C16	Connors Steel Div., Birmingham
C19	Canfield Steel Co., Canfield, O.
D1	Detroit Steel Corp., Detroit
D2	Driver, Wilbur B., Co., Newark, N. J.
D3	Driver Harris Co., Harrison, N. J.
D4	Dickson Weatherproof Nail Co., Evanston, Ill.
E1	Eastern Stainless Steel Corp., Baltimore
E2	Empire-Reeves Steel Corp., Mansfield, O.
E3	Enamel Products & Plating Co., McKeesport, Pa.
F1	Firth Sterling, Inc., McKeesport, Pa.
F2	Fitzsimons Steel Corp., Youngstown
F3	Follansbee Steel Corp., Follansbee, W. Va.
G2	Granite City Steel Co., Granite City, Ill.
G3	Great Lakes Steel Corp., Detroit
G4	Greer Steel Co., Dover, O.
G5	Green River Steel Corp., Owenboro, Ky.
H1	Hanna Furnace Corp., Detroit
H2	Hercules Drawn Steel Corp., Toledo, O.
I2	Ingersoll Steel Div., New Castle, Ind.
I3	Inland Steel Co., Chicago, Ill.
I4	Interlake Iron Corp., Cleveland
J1	Jackson Iron & Steel Co., Jackson, O.
J2	Jessop Steel Corp., Washington, Pa.
J3	Jones & Laughlin Steel Corp., Pittsburgh
J4	Joslyn Mfg. & Supply Co., Chicago
J5	Judson Steel Corp., Emeryville, Calif.
K1	Kaiser Steel Corp., Fontana, Calif.
K2	Keystone Steel & Wire Co., Peoria
K4	Keystone Drawn Steel Co., Spring City, Pa.
L1	Laclede Steel Co., St. Louis
L2	La Salle Steel Co., Chicago
L3	Lone Star Steel Co., Dallas
L4	Lukens Steel Co., Coatesville, Pa.
M1	Mahoning Valley Steel Co., Niles, O
M2	McLouth Steel Corp., Detroit
M3	Mercer Tube & Mfg. Co., Sharon, Pa.
M4	Mid States Steel & Wire Co., Crawfordsville, Ind.
M7	Milton Steel Products Div., Milton, Pa.
M8	Mill Strip Products Co., Evanston, Ill.
M9	Moltrup Steel Products Co., Beaver Falls, Pa.
M10	Mill Strip Products Co., of Pa., New Castle, Pa.
N1	National Supply Co., Pittsburgh
N2	National Tube Div., Pittsburgh
N4	Northwestern Steel & Wire Co., Sterling, Ill.
N6	Northwest Steel Rolling Mills, Seattle
N7	Newman Crosby Steel Co., Pawtucket, R. I.
N8	Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9	Nelson Steel & Wire Co.
O1	Oliver Iron & Steel Co., Pittsburgh
O2	Oregon Steel Mills, Portland
P1	Page Steel & Wire Div., Monessen, Pa.
P2	Phoenix Steel Corp., Phoenixville, Pa.
P3	Pilgrim Drawn Steel Div., Plymouth, Mich.
P4	Pittsburgh Coke & Chemical Co., Pittsburgh
P6	Pittsburgh Steel Co., Pittsburgh
P7	Portsmouth Div., Detroit Steel Corp., Detroit
P8	Plymouth Steel Co., Detroit
P9	Pacific States Steel Co., Niles, Cal.
P10	Precision Drawn Steel Co., Camden, N. J.
P11	Production Steel Strip Corp., Detroit
P13	Phoenix Mfg. Co., Joliet, Ill.
P14	Pacific Tube Co.
P15	Philadelphia Steel and Wire Corp.
R1	Reeves Steel & Mfg. Div., Dover, O.
R2	Reliance Div., Eaton Mfg. Co., Massillon, O.
R3	Republic Steel Corp., Cleveland
R4	Roebling Sons Co., John A., Trenton, N. J.
R5	Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6	Rodney Metals, Inc., New Bedford, Mass.
R7	Rome Strip Steel Co., Rome, N. Y.
S1	Sharon Steel Corp., Sharon, Pa.
S2	Sheffield Steel Div., Kansas City
S3	Shenango Furnace Co., Pittsburgh
S4	Simonds Saw and Steel Co., Fitchburg, Mass.
S5	Sweet's Steel Co., Williamsport, Pa.
S7	Stanley Works, New Britain, Conn.
S8	Superior Drawn Steel Co., Monaca, Pa.
S9	Superior Steel Div. of Copperweld Steel Co.
S10	Seneca Steel Service, Buffalo
S11	Southern Electric Steel Co., Birmingham
S12	Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13	Seymour Mfg. Co., Seymour, Conn.
S14	Screw and Bolt Corp. of America, Pittsburgh, Pa.
S15	Seaway Steel Div., Roblin-Seaway Ind., Inc., North Tonawanda, N. Y.
T1	Tonawanda Iron Div., N. Tonawanda, N. Y.
T2	Tennessee Coal & Iron Div., Fairfield
T3	Tennessee Products & Chem. Corp., Nashville
T4	Thomas Strip Div., Warren, O.
T5	Timken Steel & Tube Div., Canton, O.
T7	Texas Steel Co., Fort Worth
T8	Thompson Wire Co., Boston
U1	United States Steel Corp., Pittsburgh
U2	Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3	Ulbrich Stainless Steels, Wallingford, Conn.
U4	U. S. Pipe & Foundry Co., Birmingham
W1	Wallingford Steel Co., Wallingford, Conn.
W2	Washington Steel Corp., Washington, Pa.
W3	Weirton Steel Co., Weirton, W. Va.
W4	Wheatland Tube Co., Wheatland, Pa.
W5	Wheeling Steel Corp., Wheeling, W. Va.
W6	Wickwire Spencer Steel Div., Buffalo
W7	Wilson Steel & Wire Co., Chicago.
W8	Wisconsin Steel Div., S. Chicago, Ill.
W9	Woodward Iron Co., Woodward, Ala.
W10	Wyckoff Steel Co., Pittsburgh
W12	Wallace Barnes Steel Div., Bristol, Conn.
W13	Western Cold Drawn Steel, Div. of Standard Screw Co., Elyria, O.
Y1	Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities		Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
	City Delivery‡ Charge	Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	......	......	......	......
Baltimore	$.10	9.60	10.36	10.16	11.35	9.70	9.95	9.75	11.80	17.48	16.48	21.58	20.83
Birmingham		9.11	11.00	11.39	10.10	9.06	9.12	8.91	13.14	18.84	16.65	22.94	22.19
Boston**	.10	10.00	10.50	11.87	12.50	9.95	10.60	10.15	13.45	17.69	16.69	21.79	21.04
Buffalo**	.15	9.45	10.20	11.95	11.85	9.55	10.05	9.60	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	9.37	10.35	10.28	11.54	9.21	9.72	9.37	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	9.53	10.41	10.33	11.86	9.59	10.29	9.48	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	9.37[1]	10.81	11.07	11.66	9.45	10.11	9.69	11.40	17.21	16.21	21.31	20.56
Denver		11.55	12.53	13.03	13.72	11.39	11.90	11.55	12.98	......	......	......	20.84
Detroit**	.15	9.63	10.61	10.65	11.91	9.58	10.29	9.68	11.16	17.38	16.38	21.48	20.73
Houston**		8.67	9.48	11.35[3]	10.23	8.20	8.31	8.08	13.10	17.50	16.55	21.55	20.85
Kansas City	.15	10.53	11.37	10.95	12.70	10.39	10.91	10.55	11.72	17.17	15.87	21.87	21.12
Los Angeles		10.35[1]	12.15	12.20	12.40	10.30	10.45	10.25	14.20	18.30	17.35	22.90	22.20
Memphis	.15	9.78	10.50	10.95	11.44	9.47	9.82	9.63	12.85	18.59	16.68	22.69	21.04
Milwaukee**	.15	9.51	10.49	10.42	11.68	9.35	9.94	9.51	11.04	17.24	16.24	21.34	20.49
New York**	.10	9.91	10.44	11.64	13.67	9.99	10.45	10.15	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	......	......	8.90	8.65	9.20	8.90	10.70	......	......	......	......
Philadelphia	.10	9.90	10.10	10.99	11.35	9.70	9.95	9.75	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	9.37	10.81	11.83	11.64	9.21	9.72	9.37	11.40	17.10	16.10	21.20	20.45
Portland		10.40	12.25	12.35	12.40	10.55	11.00	10.40	16.65	18.60	17.85	22.70	22.15
San Francisco	.10	10.75	11.75[2]	11.95	12.80	10.90	11.20	10.65	15.20	18.30	17.35	22.90	22.20
Seattle		11.35	12.45	13.40	12.80	10.95	11.50	10.80	16.20	18.60	17.85	22.70	22.15
Spokane	.15	11.35	12.45	13.40	12.80	10.95	11.50	10.80	16.20	17.75	17.85	21.58	22.15
St. Louis**	.15	9.57	10.73	10.66	11.74	9.43	9.95	9.59	11.43	17.48	16.48	21.58	20.63
St. Paul	.15	8.97	9.64	10.79	11.14	8.81	9.32	8.97	11.64	......	16.69	21 79	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. **These cities are on order quantity pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—⅛" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—¾-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅝" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅝" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier: [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective Nov. 17, 1961)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50	......	......
Birmingham *W9*	62.00	62.50*	66.50	......	......
Birmingham *U4*	62.00	62.50*	66.50	......	......
Buffalo *R3*	66.00	66.50	67.00	67.50	......
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	......
Chester *P2*	68.00	68.50	69.00	......	......
Chicago *I4*	66.00	66.50	66.50	67.00	71.00†
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	......
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	......	......	......
Geneva, Utah *C7*	66.00	66.50	......	......	......
Granite City *G2*	67.90	68.40	68.90	......	......
Hubbard *Y1*	......	......	66.50	......	......
Ironton, Utah *C7*	66.00	66.50	......	......	......
Lyles, Tenn. *T3*		......	......	......	73.00
Midland *C11*	66.00	......	......	......	......
Minnequa *C6*	68.00	68.50	69.00	......	......
Monessen *P6*	66.00			......	......
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	......	66.50	67.00	67.50	......
Rockwood *T3*	62.00	62.50	65.50	67.00	73.00
Sharpsville *S3*	66.00	......	66.50	67.00	......
So. Chicago *R3*	66.00	66.50	66.50	67.00	......
So. Chicago *W8*	66.00	......	66.50	67.00	......
Swedeland *A2*	68.00	68.50	69.00	69.50	71.00†
Toledo *I4*	66.00	66.50	66.50	67.00	......
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	......	......	66.50	......	......

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel.

Add $1.00 for 0.31-0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1*, *I4*, Toledo, *I4*, $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct; 13 to 13.5 pct; 13.5 to 14 pct, add $1. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container)	*Pct*
Plain finish—packaged and bulk.	43
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	43

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container)	*Pct*
Plain finish—packaged and bulk.	43
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	43

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)

Plain finish—packaged and bulk.	43
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	43

(Minimum plating charge — $10.00 per item. Price on application assembled to bolts.)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Discount Bolts
Full Cartons	46	46

Machine Screws—bulk

¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	25.00	28.25	26.00	29.50	32.00	29.50	47.50	38.00	46.50	—	19.25–21.50	—	19.75–21.75
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	26.75	29.25–26.75	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	31.50	35.00–31.50	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	42.25	71.75	54.75	64.75	30.00	30.00	31.25 31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	43.50	46.75	45.00	49.50	56.75	49.50	76.75	62.25	75.25	40.25	40.25	42.50	38.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	29.75	33.25–29.75	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown. *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford. Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6;* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1:* Claymont, Del; *P2.*

Forging billets: Ambridge Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Discount Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 lb
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

NOTE: Ferroalloy prices are published in alternate issues.

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	AISI
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective Nov. 17, 1961)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3****	173	190	...	...	190	9.00	9.675
Atlanta *A8***	173	191	...	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	...	...	...	...	...	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	...	...	...	...	...	9.00	9.55
Chicago *W7*	173	...	...	...	...	9.00	9.55†
Cleveland *A6*	...	...	...	...	...	...	...
Cleveland *A5*	...	...	...	...	...	9.00	...
Crawf'dsv. *M4***	175	192	...	214	198	9.10	9.80
Donora Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	...	...	...	...	...	...
Houston *S2**	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	175	192	...	214	198	9.10	9.80††
Johnstown *B3***	173	190	177	...	196	9.00	9.675
Joliet Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo *C9**	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2****	...	...	...	...	...	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass *W6*	...	...	...	...	...	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	...	...	213	9.95	10.50
So. Chicago *R3*	173	187	...	...	193	8.65	9.20
S. San Fran. *C6*	...	...	...	236	...	9.95	10.50
SparrowsPt. *B3***	175	...	...	215	198	9.10	9.775
Struthers, O. *Y1**	...	...	...	...	...	8.65	9.20
Worcester *A5*	179	...	...	...	...	9.30	9.85
Williamsport *S5*	...	...	...	...	...	...	...

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only. †† 0.115¢ zinc.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50	....	....	....	....	....	....	....	....
Youngstown *R3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	....	....	....	....	....	....	....	....
Fontana *K1*	+10.75	+26.00	+7.75	+22.00	+4.25	+17.50	+1.75	+16.75	+1.25	+15.75	+0.75	+15.25	0.75	+15.50	....	....	....	....	....	....	....	....
Pittsburgh *J3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Alton, Ill. *L1*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50	....	....	....	....	....	....	....	....
Sharon *M3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	....	....	....	....	....	....	....	....
Fairless *N2*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50	....	....	....	....	....	....	....	....
Pittsburgh *N1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Wheeling *W5*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	....	....	....	....	....	....	....	....
Wheatland *W4*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	....	....	....	....	....	....	....	....
Youngstown *Y1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Indiana Harbor *Y1*	1.25	+14.0	4.25	+10.0	7.75	+5.50	10.25	+4.75	10.75	+3.75	11.25	+3.25	12.75	+3.50	....	....	....	....	....	....	....	....
Lorain *N2*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50	....	....	....	....	....	....	....	....
Youngstown *R3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	....	....	....	....	....	....	....	....
Fairless *N2*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50	....	....	....	....	....	....	....	....
Fontana *K1*	+6.25	....	+2.25	....	0.75	....	1.25	....	1.75	....	2.25	....	2.75	....	....	....	....	....	....	....	....	....
Pittsburgh *J3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Alton, Ill. *L1*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50	....	....	....	....	....	....	....	....
Sharon *M3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	....	....	....	....	....	....	....	....
Pittsburgh *N1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Wheeling *W5*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	....	....	....	....	....	....	....	....
Wheatland *W4*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	....	....	....	....	....	....	....	....
Youngstown *Y1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Indiana Harbor *Y1*	5.75	+8.0	9.75	+4.0	12.75	0.50	13.25	+0.75	13.75	0.25	14.25	0.75	14.75	+0.50	....	....	....	....	....	....	....	....
Lorain *N2*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 9.80¢ per lb.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.6
Chicago	140.0
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

Furnace, beehive (f.o.b.)	Net-Ton
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.70
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

LINDE ELECTRIC WELDING

PLASMARC

NEW... FIRST PROCESS FOR HIGH-SPEED, DROSS-FREE CUTS IN 5-IN. METALS

LINDE, inventor of plasma arc processes, now introduces *advanced* PLASMARC cutting for high-speed severing of metals up to 5 in. thick, dross-free.

PLASMARC cutting utilizes an intense plasma jet (20,000°F.) of near-sonic-velocity (4000 ft./sec.), which melts-and-forces a narrow kerf through the metal. After six years' success, it is now replacing shearing, sawing, powder cutting—slower methods which usually require machining of the cut edge. *PLASMARC cutting delivers these advantages:*

- Dross-free cuts in stainless steel (2 in.), aluminum, magnesium, copper up to 5 in. thick.
- Clean-cuts 4-in. stainless, nickel, carbon steel (without iron powder), "Monel," "Inconel," cast iron, high-alloy and clad steels.
- High-speed cutting—up to 300 ipm.
- Precise cuts—holds tolerances to 1/16 in.
- Narrow heat band—as thin as .006 in. wide.
- Little or no change in metallurgical properties.

For full details, contact your local LINDE office or write direct.

LINDE COMPANY
Division of Union Carbide Corporation
270 Park Avenue, New York 17, New York

UNION CARBIDE

FERROALLOY PRICES

NOTE: Prices of Boiler Tubes, Clad Steel, C-R Spring Steel, Electrical Sheets, Electrodes, Electroplating Supplies, Metal Powders, Rails and Track Supplies, and Refractories are published in alternate issues.

Ferrochrome

Base prices per lb of contained chromium, carload lots of lump material in bulk, unless noted.

High-Carbon

4.00-6.00% C, 55-63% Cr, 8-12% Si, .03% max S	23.00
4.00-7.00% C, 67-71% Cr, 1-2% Si	24.00
4.25% max C, 58-65% Cr, 1% max Si, .03% max S	24.00
5.25% max C, 58-65% Cr, 3% max Si, .03% max S	22.00

Low-Carbon

2.00% max C, 65-71% Cr, 2% max Si	32.50
.75% max C, 67-73% max Cr, 2% max Si	33.00
.025% max C, 68-73% Cr, 2% max Si	33.50
.05% max C, 67-73% Cr, 2% max Si	33.00
.05% max C, 63-67% Cr, 4-6% Si	32.50

Bricks or Pellets

.025% max C, 63-68% Cr, 4-7% Si	32.50
.025% max C, 68-71% Cr, 2% max Si	33.00
.010% max C, 63-68% Cr, 4-7% Si	33.00
.010% max C, 68-71% Cr, 2% max Si	33.50

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule.

Ferrochrome Silicon

Carloads, delivered lump, per lb of material.

39-41% Cr, .05% max C, 42-45% Si	11.50
44-47% Cr, .15% max C, 37-39% Si	12.60

Chromium Metal

Per lb chromium, contained, packed delivered, ton lots, 97.25% min. Cr, 1% max. Fe.

0.10% max. C	$1.29
9 to 11% C, 88-91% Cr, 0.75% Fe	1.38

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.

Carloads	$1.15
Ton lots	1.17
Less ton lots	1.19

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Cr, 60-65% Si, 3.00 max. Fe.

Carloads, bulk	24.00
Ton lots	27.95
Less ton lots	29.45

Calcium-Maganese—Silicon

Cents per lb of alloy, lump, delivered, packed.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads, bulk	23.00
Ton lots	26.15
Less ton lots	27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots	21.15
Less ton lots	22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed max. St. Louis, V-5: 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots	18.45
Ton lots	19.95
Less ton lots	21.20

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload bulk	19.20
Ton lots to carload packed	21.15
Less ton lots	22.40

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn. Carload lots, bulk.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	11.00
Houston, Tex.	11.00
Johnstown, Pa.	11.00
Lynchburg, Va.	11.00
Neville Island, Pa.	11.00
Sheridan, Pa.	11.00
Philo, Ohio	11.00
Rockwood, Tenn.	11.00
S. Duquesne	11.00

Add or substract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk	13.70
Ton lots packed in bags	16.10

Spiegeleisen

Per gross ton, lump, f.o.b., 3% Si max.

	Palmerton, Pa.		Neville Is., Pa.
Mn	10 lb, pig	35 lb, down	35 lb
16-19%	$98.00	$96.00	$100.50
19-21%	100.00	98.00	102.50
21-23%	102.50	100.00	105.50

Manganese Metal

2 in. x down, cents per pound of metal delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed	45.75
Ton lots	47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads, bulk	34.25
Ton lots, palletized	36.25
250 to 1999 lb	39.00
Premium for Hydrogen - removed metal	0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn	24.00

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, packed, del'd Mn 85-90%.

	Carloads (Bulk)	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	31.10	33.90	35.10
0.30% max. C	29.80	32.60	33.80
0.50% max. C	28.50	31.30	32.50
0.75% max. C, 80.85% Mn, 5.0-7.0% Si	27.00	29.80	31.00

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.3¢ f.o.b. shipping point.

Carloads bulk	11.60
Ton lots, packed	13.25
Carloads, bulk, delivered, per lb of briquet	14.00
Briquets, packed pallets, 2000 lb up to carloads	16.40

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, frieght allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots,	Carloads,
98.25% Si, 0.50% Fe	22.95	21.65
98% Si, 1.0% Fe	21.95	20.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.

Carloads, bulk	8.00
Ton lots, packed	10.80

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si	14.50	75% Si	16.90
65% Si	15.75	85% Si	18.60
90% Si	20.00		

Ferrovanadium

50-55% V delivered, per pound, contained V, in any quantity.

Openhearth	3.20
Crucible	3.30
High speed steel	3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
100 to 1999 lb	2.40	3.30	4.55

(Effective Nov. 17, 1961)

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y. per lb.

Carloads, bulk	9.85¢
Ton lots	11.20¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo	$1.63

Ferrocolumbium, 58-62% Cb, 2 in. x D, del'd per lb con't Cb

Ton lots	$3.45
Less ton lots	3.50

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Cb plus Ta	$3.40
Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo	$1.89

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $5.00 unitage,

per gross ton	$120.00
10 tons to less carload	$131.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Vanadis, O., O., freight allowed, ton lots,

per lb contained Ti	$1.35
Less ton lots (200 lb and up)	$1.37

Ferrotitanium, 30% low carbon, 0.10% C max., 27-32% Ti, Vanadis, O., freight allowed, per lb

contained Ti, ton lots	$1.35
Less ton lots (200 lb and up)	$1.40

Ferrotitanium, 1-3% Carbon, 17-20% Ti, f.o.b. shipping point, freight allowed, carload per

net ton	$250.00
Ton lots	$260.00

Ferrotungsten, ¼ x down packed per pounds contained W, ton lots delivered	$2.45 (nominal)

Molybdic oxide, briquets per lb. contained Mo, f.o.b. Langeloth,

Pa.	$1.62
bags, f.o.b. Washington, Pa., Langeloth, Pa.	$1.59

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.

Carload, bulk lump	18.50¢
Ton lots, packed lump	20.50¢
Less ton lots	21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5	$1.38

Zirconium silicon, per lb of alloy

35-40% del'd, carloads, bulk	26.25¢
12-15%, del'd lump, bulk-carloads	9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B

2000 lb carload	$5.50

Ferro Zirconium Boron, Zr 50% to 60%, B 0.8% to 1.0%, Si 8% max., C 8% max., Fe balance, f.o.b. Niagara Falls, New York, freight allowed, in any quantity per pound	30¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.

Ton lots per pound	18.25¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots	$1.20

F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up

10 to 14% B	.85
14 to 19%	1.20
19% min. B	1.50

Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb & over

No. 1	$1.05
No. 79	50¢

Manganese-Boron, 75.00% Mn, 17.50% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd

Ton lots (packed)	$1.46
Less ton lots (packed)	1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots	2.15

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10 Ton 61' Span 230V DC
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THE CLEARING HOUSE

West Coast Market: Good to Excellent

Used machinery upturn which is now several months old is gaining momentum. It promises to boost prospects for 1962.

Reports from Los Angeles and Seattle show strong market with plenty of sales potential.

▪ Used machinery dealers on the West Coast are now feeling the effects of increased defense spending. They report business ranges from good to excellent.

1962 Looks Strong — The improvement that got underway several months ago continues to gain momentum. And there's every reason to expect this trend to spill over into next year.

One dealer closed a "multi-million dollar deal" in the Los Angeles area that will keep his firm busy for at least four months; he says business would be good even without this.

Small Shops—The larger defense contractors are farming out more and more work to subcontractors. The stream of new small shops continues to pour on demand. Most wanted used equipment: Mills, drills, lathes, grinders.

Some dealers even talk about occasional shortages of better-condition tools—not more than 10 years old. Good sheet metal equipment sometimes is hard to find.

Firm Market—Prices are holding firm. The softness that dominated the market several months ago seems to be pretty much out of the picture. Good machinery will bring about 60 to 70 pct of the cost of equivalent new equipment.

Dealers are buying specialized machinery in eastern markets. Example: Large presses, running from $10,000 to $30,000.

Solid reasons why California dealers expect business to continue its upswing next year: New plants and expansions; and more defense spending.

Ready Money — Credit is no problem, dealers report. In fact, one dealer is surprised the way some of the small operators cough up the ready cash. He's wondering where they're getting it.

Another dealer, who says an unusually busy three weeks has just gone by, observes that the volume of inquiries also is holding high. It's an encouraging sign, he feels.

Foreign vs Domestic—How's foreign equipment doing? Well enough, yet the demand isn't as brisk as it was. Resistance again is building up. Why? Replacement parts are not always on hand. Yet, there's a limited demand for some highly specialized equipment.

Northwest Market—Seattle used machinery dealers report a happy sales upsurge.

Reasons: The multi-million dollar impetus of the forthcoming World's Fair. There's a construction boom on the Fair site. And there is a massive freeway building program.

Fast Moving—Dealers say their market is steadily expanding. It's keeping pace with these two construction programs.

Pacific Car and Foundry Co., benefitting from the World's Fair work, is a bellwether for the purchasers of used machines. The company is building the 500-ft-high Space Needle at the Fair.

LIQUIDATION PLATE ROLLING MILL

Mill Facility, Equipment and Material of the former Phoenix Steel Corp. Plant located at Harrisburg, Penna.

LOCOMOTIVES

(1) 20 Ton Plymouth Diesel 36" Ga. Cummins

(1) 20 Ton Plymouth Gasoline 36" Ga. LeRoi

MILL DRIVE

(1) 3,000 HP General Electric Slip Ring Motor, 2,300 Volt, 60 Cy., 3 PH., 356 RPM with Comp. panel, and lub. system, air wash sys.

ELECTRIC ARC MELTING FURNACE

HEROULT Model 15 Electric Arc Melting Furnace. Shell Diameter 14'-0"; Inside Diameter 12'-0" Side Charge. Cold scrap charge 30,000#/40,000#. Electrode size 14" diameter x 60" long. Transformer General Electric 6,000 KVA Primary Voltage 13,200/26,400 Sec. 265/92 volts; built in reactor. GE Automatic Control Panel. Westinghouse tot. enel. drawout switch-gear. With approx. 160 spare electrodes and nipples, door frames, rings, motors, etc. S/N 236 Mfd. Heroult Div. U. S. Steel Corp.

SHEARS

1,000 Ton HOT UPCUT SLAB SHEAR Capacity 6" thick x 60" wide, stroke 12½", 8 cuts per min, 32" hyd. hold down cylinder, 1320# w.p., 600 HP Bingham Pump and motor drive. Auto. Length of cut gauge, adj. from 30"/120" length of cut. Approach and runout tables, crop kickoff, operator pulpit, relate and control panels. Man. Pittsburgh Engineering and Machine Co.—1949.

TRANSFORMERS

(1) 7,500 KVA Wstghse. 66,000 Pri. 13,800 Sec 3 PH 60 S/N 4089566 Yr. 1948.

(3) 2,000 KVA GE 13,200/26,400 Pri. 2,400/4,150Y, Sec. 1 PH 60 S/SN 2871432; 2871433; 287140.

(3) 667 KVA GE 2,300/4,000Y Pri 460 Sec. 1 PH 60 S/N 4497213; 4497214; 4497215.

ROLLING MILL EQUIPMENT SLAB EDGER MILL

(1) Slab Edger Mill, Pittsburgh Engr. Co. S/N 48147 (New 1949). Capacity 72" x 18" thick slab, Roll Size (2) 43" Diameter x 24" Working Surface—, Alloy Steel. Motor Drive 1,000 HP & reduction gear. Complete with starter, Controls, Etc. (1) MG Set, General Electric 1,000 KW, Generator-600 V DC 1667 Amperes. Motor — 1,400 HP 2300/3/60.

(1) Birdsboro 34" Blooming and Slabbing Mill, 72" Wide, 2 High, Reversing, 28" x 66" Ingot. Minimum Thickness 2", Maximum Lift 28". Maximum Ingot weight 30,000#. (Approx.). Approach Table 38' Long, Runout Table 26' Long. Both Tables Motor Driven 50 HP 230 V DC: Hydraulic Slab Shear. Pittsburgh Engr. Co., S/N 48148, New 1949: Capacity 1,000 Tons, 6" Thick x 60" Wide Steel Slab (Hot); Hydraulic Pump, 8 Stage Bingham. 500 gpm @ 1,440 psi. Motor Drive—600 HP 2,300/3/60, Starters, Controls, Etc.

(1) Birdsboro 126" Plate Rolling Mill, 126" Wide, 3 High 34" Dia. Rolls. 15" Maximum Lift, Minimum Thickness 3/16", Maximum Slab or Ingot Size 115" Wide x 15" Thick. Maximum Weight 22,000# (Approx.). Tilting Tables, Front and Back: 3,000 HP Electric Motor Mill Drive. Runout Table 54' Long to Plate Leveller; Plate Leveller, 11 Driven Rolls (5 Upper and 4 Lower), 148" Between Housings. Motor Drive—50 HP 230 V DC.

(2) Plate Levellers, 6 Upper and 5 Lower Work Rolls, Motor Drive—55 HP 230 V DC.

(1) Birdsboro 42" Universal Plate Rolling Mill, 2 High, Reversing, Maximum Lift 26", Maximum Width 42". Minimum Width 7". Minimum Thickness ¼", Maximum Weight 14,000# Ingot (Approx.). Vertical Side Rolls each side of Mill Housings for Rolling Plate Width. Front Mill Table 45' Long.

OVERHEAD TRAVELLING CRANES

(1)	150 Ton/40 Ton Morgan	Ladle Crane 59'-6" Span
(2)	20/5 Ton Shaw Box	65'-0" Span
(1)	20 Ton Milwaukee Crane (1949)	46'-10" Span
(2)	15 Ton Morgan	64'-6" Span
(1)	10 Ton Alliance	70'-0" Span
(1)	10 Ton Shaw Box	64'-6" Span
(1)	10 Ton Milwaukee	65'-0" Span
(1)	10 Ton Alliance	60'-0" Span
(4)	10 Ton Alliance	56'-6" Span
(1)	5 Ton Alliance	64'-6" Span
(2)	5 Ton Alliance	61'-6" Span
(1)	5 Ton Northern	44'-6" Span
(1)	5 Ton Alliance	40'-4½" Span
(1)	5 Ton Phoenix Stl.	35'-0" Span
(1)	15 Ton Milwaukee Bridge Only (1949)	70'-0" Span

Spare Trolleys, 5 ton, 10 ton, 15 ton; contractor panels; cab controls; Resistance banks.

EDGE TRIMMING AND SLITTING SHEAR

Capacity 96" wide x 7'16" thick plate. Arbor 12" diameter, circular cutters 16" diameter x 2⅜" face. Cutting speed adjust to 62 fpm Drives 65 HP, 250/1,000 RPM, 230 volt, DC., with operator's pulpit, controls, etc. Mfd. by Monarch Tool & Die Co., Milwaukee, 1949. Approx. wt. 80,000#.

METALLURGICAL HOT BLAST CUPOLA

Rated 15/20 tons hr. Shell dia. 8'-11"; hearth dia 7'-0"; stack height 40' (12) water cooled tuyeres 3.81" dia. Heat exchanger for preheating 12,000 CFM to 960/1000°F, with Allis Chalmers blowers, motors, controls. Charging equipment, cyclone dust collector, piping, valves, operating and control instrumentation. Installed 1954.

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(1) 1500 PSI Pump (Worthington). Size 4⅞" x 24", Cap 500 GPM, 1941. 1500 PSI. Duplex Reciprocating Drive —GE 700 HP Synchronous Motor, 2200 Volts.

(1) 1500 PSI Pump (Clearing), 1944. Size 6 3/16" Bore HT-250, Cap 250 GFM. 1500 PSI. Type Triplex Horizontal Plunger. Drive—250 HP Induction Motor, 440 volts.

Accessories (1) 34" OD 27' 6" High 1 12/16" Thick Pneumatic-Hydraulic Accumulator Bottle. ASME, Penna. Std. with Automatic Water Level Control.

(1) 8' OD x 12' Storage and Return Flow Tank.

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50 KW; 80 KW; 100 KW 2 station 9600 cy.—
15 KW GIRDLER Dielectric Heater
20 KW THERMONIC Induction Heater 2 station
20 KW ECCO Induction Heater

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5 ton-50'-AC. W/300' of "A" Frame Runway, M.G. Set, Magnet, Bucket.

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175 KW AJAX Induction Mltg. Installation Ideal for non-ferrous work. With 2 lift coils, has tilting furnace for steel melting
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30 KW VACUUM Melting, Complete—Like New
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48x72 WHEELABRATOR w/loader
1A WHEELABRATOR Multi-table
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- 1—38" CONTINUOUS HOT STRIP MILL.
- 1—40" 2-HIGH BLOOMING MILL.
- 1—3-HIGH PLATE MILL, 40" & 29½" x 112".
- 1—32" & 20" x 56" 3-HIGH SHEET MILL, with motor driven screwdown and pre-set controls.
- 1—25" & 42" x 66" HOT STRIP MILL, 4-high.
- 2—29" 2-HIGH HOT SHEET MILLS with tables.
- 1—26" COLD SHEET MILL TRAIN, 5 stands.
- 1—16" x 28" COLD MILL, 2-high, 200 HP drive.
- 2—12¾" x 15¾" COLD MILLS, 2-high, roller bearings, 100 HP motors.
- 2—10" x 14" 2-HIGH COLD MILLS, 100 HP DC drives, with one coiler.
- 1—3½" & 8½" x 5½" STRIP MILL, 4-high.
- 1—16" BAR MILL, 3-high, single stand, NEW.
- 1—10" BAR MILL, 3-high, 5 stands, with two 16" 3-high roughing stands, drives, tables, flying shear, double mechanical hot bed.
- 1—9" BAR MILL, 3-high, five stands.
- 1—VERTICAL OPEN-SIDE BAR SHEAR, 28".
- 2—SQUARING SHEARS for ¼" x 156" sheets.
- 1—STRAIGHTENER, SUTTON NO. 1 SPECIAL, for bars ¼" to 1½", tubes ¼" to 2".
- 1—LEVELLER FOR ¼" PLATES, 9 rolls, 9" dia. x 108" face, 20 HP motor.
- 1—LEVELLER FOR SHEETS, 17 rolls, width 66", rolls 4⅛" dia., 25 HP motor.
- 1—AUTOMATIC SQUARING SHEAR UNIT for sheets, 160" side cut, 62" end cut.
- 1—ROLL GRINDER, 36" x 12', heavy duty, crowning, concaving and tapering.
- 1—50" ROLL LATHE, enclosed headstock, tailstock, 50 HP motor, 19' between centers, bed length 31'.
- 1—ROLL LATHE, enclosed headstock, rolls 14" to 26" dia., 30 HP motor, bed length 21'.
- 2—42" WIDE COIL BUILD-UP LINES.
- 1—3000 HP GEAR DRIVE, ratio 2.68 to 1.
- 1—3000 HP GEAR DRIVE, ratio 4.6 to 1.
- 1—1600 HP GEAR DRIVE, ratio 10 to 1.
- 1—1200 HP GEAR DRIVE, ratio 9.47 to 1.
- 1—400 HP GEAR DRIVE, ratio 8.2 to 1.
- 1—4000 HP MOTOR, 11200/3/60, 510 RPM.
- 1—3500 HP MOTOR, 11000/3/60, 514 RPM.
- 1—1600 HP MOTOR, 2200/3/60, 270 RPM.
- 1—400 HP MOTOR, 2300/4600/3/60, 450 RPM.
- 1—175-TON HOT METAL CRANE, 54' span.
- 1—7½-TON SOAKING PIT CRANE, 85' span.

MECHANIZED SHEET MILL—3-HIGH AND 2-HIGH MILLS, CONTINUOUS FURNACES, ETC.

MODERN TWIN STRAND 17-STAND SEMI-CONTINUOUS ROD MILL WITH FURNACE, DRIVES, REELS, COIL CONVEYOR SYSTEM.

FRANK B. FOSTER, INC.

Oliver Building, Pittsburgh 22, Pa.
Cable: "Foster Pittsburgh" Phone Atlantic 1-2780

4400 KW RECTIFIERS

consisting of:

4—1100 KW Allis Chalmers

MERCURY ARC RECTIFIERS

Electrical Characteristics

INPUT: 2—4400 KVA TRANSFORMERS
Primary: 33,000 V. 4160 V. 2300 V.
Secondary 275 to 86 V. with 34 Variable
Taps—Changed under load

4—1320 KVA 3 phase TRANSFORMERS
Primary 4160 V. Delta; Secondary 277 V.
to Neutral with INTERPHASE REACTORS

DC OUTPUT—4000 Ampor Multiple
4400 KW 86 to 275 V. or
2200 KW 172-550 V.

- **Can be used in Multiples to Suit Requirements**
- **Controls & Transformers can be Purchased without Rectifiers**

HEAT & POWER CO., INC.

60 E. 42 St., N.Y. 17 Murray Hill 7-5280

EQUIPMENT AND MATERIALS WANTED

WANTED

Used tube and bar cut-off machine with automatic feed and cut-off. Capacity ¼" to 3" Dia. through spindle. Up to 16 ft. maximum cut-off length. Front and rear cross slides. 440-volts Modern No. 3-E or equal. Advise price, delivery, location and condition.

HARVEY ALUMINUM
19200 S. Western Avenue
Torrance, California
Purchasing Agent

SURPLUS STEEL

NEW *WANTED* USED

Structurals, Plate, Pipe and Tubing

Consumers Steel & Supply Co.

P. O. Box 270, RACINE, WISCONSIN

WEISS STEEL CO., INC.
600 WEST JACKSON BLVD.
CHICAGO 6, ILLINOIS CEntral 6-1936

Buyers of Surplus Steel and Machinery Inventories

WANTED SURPLUS STEEL

WALLACK BROTHERS

7400 S. Damen Ave. Chicago 36, Illinois
GROVEHILL 6-7474

WANTED

Tube Reducer or Rockrite Machine, capacity 3½" or smaller tubes. Write to

BOX H-235
c/o IRON AGE, Chestnut at 56th, Phila. 39

WANTED

BRIDGE CRANES

ARNOLD HUGHES COMPANY
2765 PENOBSCOT BLDG., DETROIT, MICH.
WOodward 1-1894

WANTED TO PURCHASE—any quantity

CARBON—ALLOY—STAINLESS

Bars—Billets—Sheet—Plate

THE GILBERT MERRILL STEEL CORP.
91 New York Ave.—Westbury, L. I., N. Y.
EDgewood 3-7300

EMPLOYMENT EXCHANGE

Help Wanted

WANTED

Plant superintendent (with degree in metallurgy and 4 to 5 years shop experience) wanted by manufacturer of open-die forgings. Opportunity for advancement. Please send detailed resume of qualifications to

BOX H-238
c/o IRON AGE, Chestnut at 56th, Phila. 39

APPLICATION ENGINEER

PRODUCT MARKETING MANAGER

■ Fabricating Division of Philadelphia area steel manufacturer has new position for man with M.E. or I.E. degree and experience in sheet metal design and production techniques. Emphasis will be on marketing aspects of new product and expansion of current line. Must have ability to utilize engineering and production facilities to achieve marketable, competitive products. Some travel required. Give full details including salary requirements in letter to:

B-62, P. O. BOX 2069
Philadelphia 3, Pa.

Representatives Wanted

REPRESENTATIVES WANTED

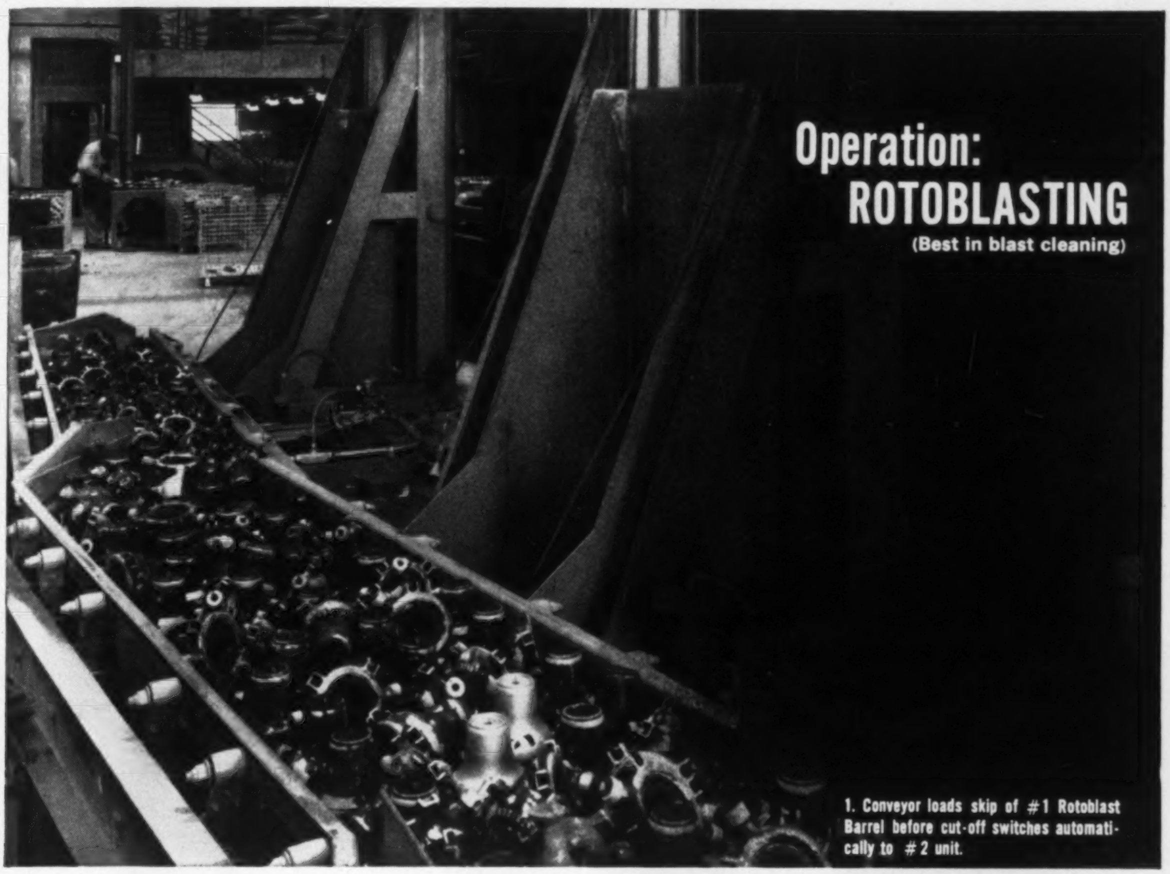
One of the nation's leading Ductile Iron, Gray Iron, Brass and Aluminum Foundries needs more representatives. Send resume and advise area desired.

BOX H-234
c/o IRON AGE, Chestnut at 56th, Phila. 39

MANUFACTURERS' AGENTS

Wanted by Steel and Alloy Plate Fabricator of pressure vessels, tanks, weldments and general custom fabrication. A profitable line for representatives calling on Industrial, Engineering and Construction accounts.

BOX H-237
c/o IRON AGE, Chestnut at 56th, Phila. 39



1. Conveyor loads skip of #1 Rotoblast Barrel before cut-off switches automatically to #2 unit.

Complete automation in blast cleaning!

Pangborn Rotoblast removes heavy sand cores and cleans up to 45,000 castings per shift at Neptune Meter!

A new and *completely automatic* Rotoblast operation not only cleans castings in half the time, but a new special separation removes heavy sand cores as well at Neptune Meter Co., Long Island City. The world's largest exclusive manufacturer of meters for liquids, Neptune can now handle 45,000 castings from the molds each shift . . . with just two automated Rotoblast Barrels.

No costly or time-consuming manual lifting, toting or weighing here! Once the button is pressed, the Rotoblast sequence starts and recycles automatically until stopped at the end of the shift!

Whether your installation features automation or batch cleaning, Rotoblast cleaning efficiency can cut *your* operating and manpower costs. Flexibility of installation, ease of maintenance, durable construction—all contribute to lower overall cleaning costs.

Write Pangborn Corporation, 1500 Pangborn Blvd., Hagerstown, Md., Pangborn Canada, Ltd., 47 Shaft Road, Toronto (Rexdale), Canada; or phone district office in Yellow Pages, "Sand Blast Equipment." *Manufacturers of Blast Cleaning, Vibratory Finishing, Dust and Fume Control Equipment—Rotoblast® Steel Shot and Grit®.*

Pangborn
OF HAGERSTOWN

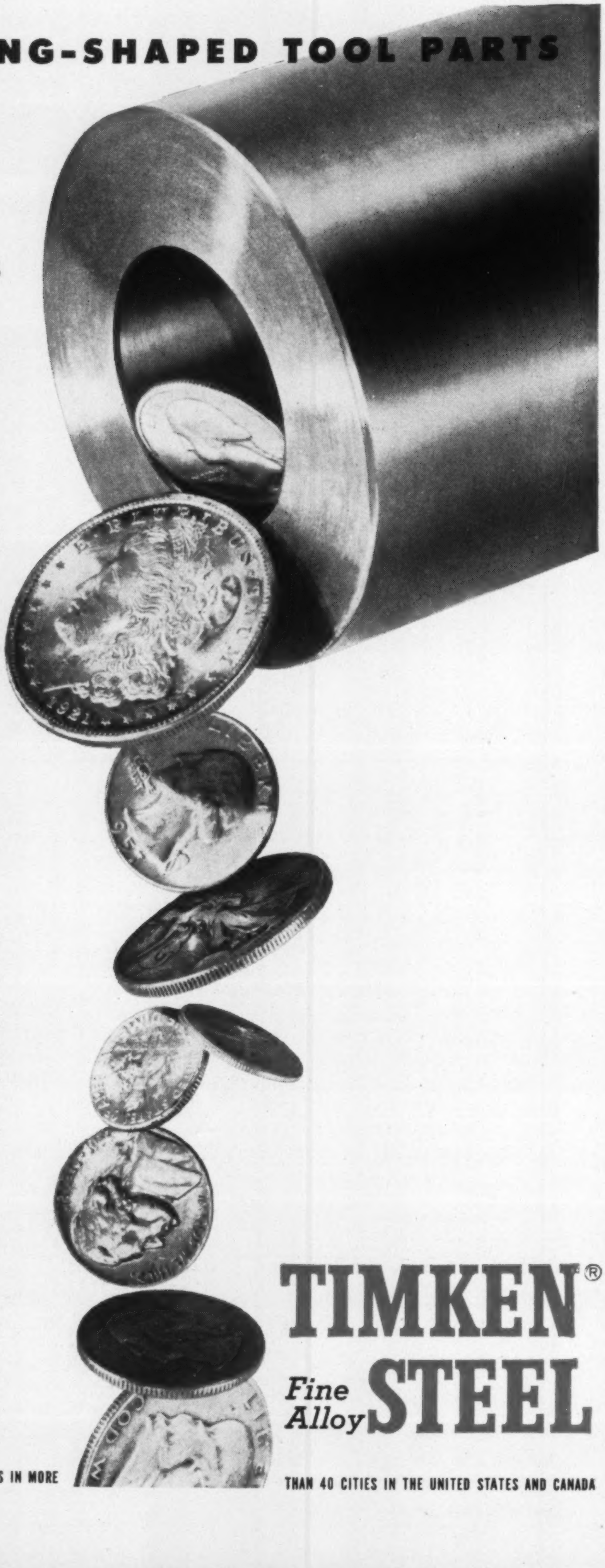
2. Skip fills second unit with exact pre-determined load for cleaning.

3. Cleaned castings move on take-away conveyor to next operation.

4. Before and after Rotoblasting. Note core sand and rods in uncleaned piece.

IF YOU MAKE RING-SHAPED TOOL PARTS

...This hole is money in your pocket



You cut the cost of making ring-shaped tool steel parts when you make them from Graph-Mo Hollow Bar®. You can start with finish boring because the hole's already there. You eliminate one big machining operation.

And you keep right on saving. You'll machine Graph-Mo easier because the free graphite in its structure makes it machine 30% faster than ordinary tool steels.

Your Graph-Mo parts will last longer too. Diamond-hard carbides in its structure make it outlast ordinary tool steels three to one, according to actual user reports.

You can't beat Graph-Mo for stability, either. A master plug gage made of Graph-Mo showed less than ten millionths of an inch dimensional change after twelve years of use.

There is only one Graph-Mo and the Timken Company makes it. Buy it in the hollow bar form for your ring-shaped tool steel parts and save. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO." Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.

TIMKEN®
Fine Alloy **STEEL**

TIMKEN GRAPHITIC STEELS ARE AVAILABLE FROM STEEL SERVICE CENTERS IN MORE THAN 40 CITIES IN THE UNITED STATES AND CANADA